MUSEUM OF
APPLIED SCIENCE,
VICTORIA

Museum Victoria
71986

THE JOURNAL of The Department OF AGRICULTURE

VICTORIA · · AUSTRALIA

Vol. XL.—Part I. JANUARY, 1942. PRICE, 3D.

Vol. XL.—Part 12. DECEMBER, 1942. PRICE, 3D.

Contents.

JANUARY, 1942

		PAGE.
Harvesting Onion Seed	*F. A. Maher, B.Agr.Sc., and G. N. Hyam*	1
Marketing Tomatoes		4
Erosion Control—Methods in Use at Dookie College	*G. B. Woodgate, B.A., Dip. Ed.*	5
The Foot or Leg Louse of Sheep	*W. D. Shew, G.M.V.C., B.V.Sc.*	15
Superphosphate Rationing		16
Fertilizer Registrations for 1942		16
Pasture Plants of Victoria—6 (Cocksfoot and Timothy)	*W. D. Andrew, M.Agr.Sc.*	17
Brucellosis Free Herds (Swine)		25
Hydatid Disease of Animals and Man	*G. Nicol, B.V.Sc.*	26
Live Stock Notes—Reminders for January–February.	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	28
The Agricultural Lime Act—Brands Registered for 1942	*W. C. Robertson, Chemist*	32
Weed Seeds in Flax	*Margot E. H. Cowen, B.Agr.Sc.*	35
Records of Pig Production at Longerenong College	*G. C. Griffiths*	43
Tubercle Free Herds		47
Garden Notes	*J. L. Provan, B.Agr.Sc.*	48
Orchard Notes	*J. L. Provan, B.Agr.Sc.*	50
Apricots and Peaches	*Rachel M. Peile*	51

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

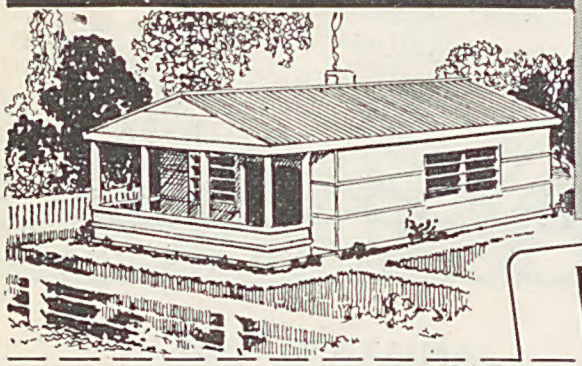
The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

Plan farm buildings for ECONOMY with HARDIE'S GENUINE FIBROLITE ASBESTOS CEMENT BUILDING SHEETS



PLEASE SEND FREE FIBROLITE BOOKLET

NAME_____

ADDRESS_____

New erections or additions to existing farm buildings can be carried out with Fibrolite Asbestos Cement Building Sheets at bed-rock cost. Any handy man can erect Fibrolite, and the modern Fibrolite Horizontal Mould ensures attractive designs.

MAIL COUPON FOR ILLUSTRATED BOOKLET

JAMES HARDIE & COY. PTY. LIMITED

Cor. CITY ROAD & CLARENDON ST. South Melbourne, S.C.5 (Phone MX4727)

INDEX TO ADVERTISEMENTS

FRONT SECTION

Bayer Pharma Ltd. (Ceresan) ... opp. p. 19

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) ... ... opp. p. 18

Goodyear Tractor Tyres ... ... opp. p. 6

Hardie, James & Co. Pty. Ltd. ii

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. (Farmall-A Tractor) v

Law Somner Pty. Ltd. (Seeds) vi

Leggo, Victor, & Farmers Ltd. ... inside cover

State Savings Bank iv

Vacuum Oil Co. Pty. Ltd. ... opp. p. 7

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) iv

BACK SECTION

A. H. McDonald & Co. Pty. Ltd. (Vetamac) .. .. opp. p. 46

Ajax Insurance Company Ltd. ... outside cover

Australian Cement Ltd. ... ... inside cover

Blyth Chemicals Ltd. ... ... opp. p. 47

Burton Bradley (Cauliflower Seed for Sale) vii

Cameron & Sutherland Pty. Ltd. ... opp. p. 46

Cockbill, J. vii

Davis Gelatine Pty. Ltd. ... ... opp. p. 35

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 34

Lysaght Bros. & Co. Pty. Ltd. ... opp. p. 35

Rylands Bros. (Aust.) Pty. Ltd. ... opp. p. 47

Trewhella Bros. Pty. Ltd. ix

Victorian Railways ix

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Journal of Agriculture, Victoria—January, 1942.

Harvesting Onion Seed

By

F. A. MAHER, B.Agr.Sc., Assistant Horticultural Research Officer, and G. N. HYAM, Seeds Officer.

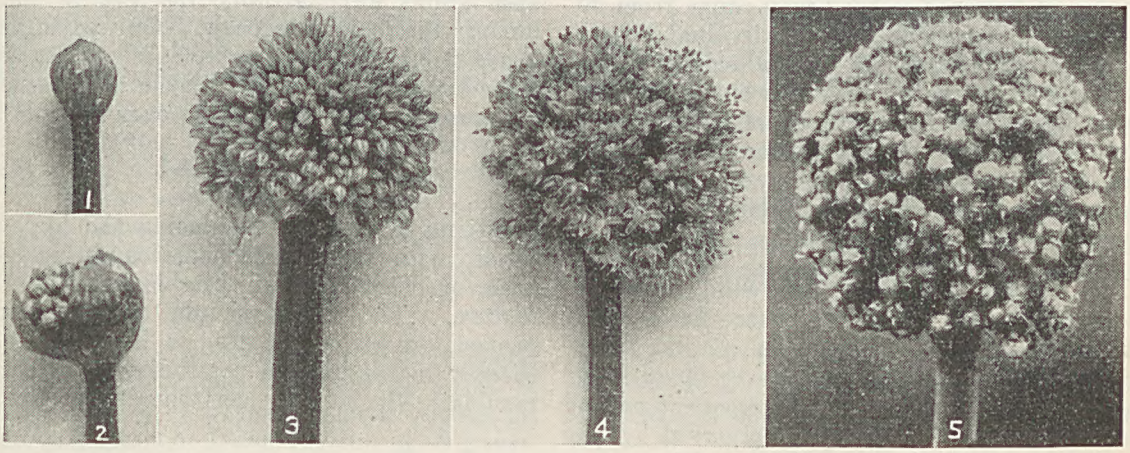


Fig. 1.—Stages in the development of the onion seed head from bud to seed capsule formation.

DURING the last winter and early spring greatly extended areas were planted with Australian Brown onion bulbs, for the purpose of raising seed for the local and export commercial trade and the Onion Seed Gift Scheme.

Since the quality and yield of seed depend largely on the timing and efficiency of harvesting, it is essential that people who have had little experience in the growing of onion seed should become familiar with the various stages of development from flowering to maturity of the seed head.

In the early stages of growth, it will be noticed that one or more flower heads quickly appear. These heads are usually small, and their stems relatively short. They arise from the central shoot and function as "stop buds," their purpose being to encourage the plant to stool out. This stage is closely followed by the appearance of the main crop of flowers, which is produced on stems of greater length. The number of flower stems per plant ranges from one to twenty, or more, depending on the size of mother bulb, the variety and climatic conditions.

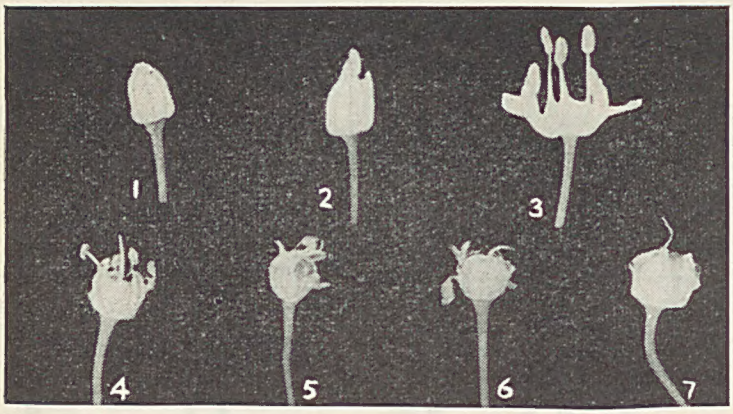


Fig. 2.—Stages in the development of a single onion flower from bud to immature seed capsule.

The flowers are borne in simple umbels (heads) at the upper end of the elongated stem, the young buds being enclosed within a papery bract (Fig. 1, "1"), which is split open by pressure of the developing buds shortly before the flowers open (Fig. 1, "2 and 3"). The number of flowers per head may range from 50 or less to 2,000 or more. The individual flowers have six floral leaves in two whorls of three each and six stamens in two whorls of three each. The seed pod is three-celled, with two seeds in each cell. The flowers of a single head may continue to open over a period of two weeks, or longer, and a plant may be in flower for 30 days or more.

Pollination is effected by wind, and by insects that go from flower to flower and visit the nectaries at the base of the inner stamens. Inter-pollination among flowers of the same head is, no doubt, of frequent occurrence as the same insect may be observed to visit many flowers on a head before leaving. In the onion, however, cross pollination is the rule.

It is usual for the topmost capsules to mature first, but the maturity of the remaining florets on an individual head is not long delayed after the first capsules ripen.

Harvesting.

The head is ready to harvest when approximately one-quarter of the seed pods have dried out and commenced to break open, exposing the black seeds. Color of unexposed seed is not a reliable guide to seed ripeness, for, although the seed coat may be black, the inside is frequently still in the milky stage, and the seed is not fit to harvest until the centre has attained a doughy consistency. Maturity is also indicated by the tendency of the flower stem to lose its bright-green colour and become yellowish. In warm weather it is necessary to watch closely for these signs, for it is at this stage that harvesting should commence.

The seed heads do not ripen together, and this necessitates gathering the crop in more than one cutting. If the crop is left until all the heads are ripe, there is a considerable loss of seed from shattered capsules. On the other hand, harvesting of immature heads will result in a shrivelled, light-weight sample, of poor viability. The correct timing of the harvesting process, therefore, is all important, and the crop should be gone through carefully at frequent intervals and each ripe head cut with about 8 or 9 inches of stem attached. The stem allows any partially-ripe seed to mature during the curing process. On cutting, the heads should be left in an upright position until placed in a bag or bucket. Such a container is necessary to save any seed in open capsules.

Curing.

Curing is effected by placing the harvested heads, with stalks attached, loosely in chaff bags, or other bags of suitable size and loose texture. The heads should not be tightly packed, otherwise sweating is likely to occur, thereby increasing the possibility of attack by moulds. The curing bags should be filled to

Fig. 3.—Harvesting onion seed crop.

Fig. 4.—Onion seed-heads being cured before threshing.

approximately one-half of their capacity, and then hung over a wire fence or from the rafters of a shed to facilitate the drying of the heads (Fig. 4).

In the handling of small areas, curing may be accomplished by spreading the heads in thin layers on sheets on the floor of a shed, on netting racks, or even in the open, if there is little danger of rain falling.

If the weather is warm and dry, curing is completed in a few days, this stage being indicated by the ease with which seed is shed from the capsules, and by the dry, brittle nature of the attached stem.

Threshing.

Threshing may be delayed for several weeks, provided that adequate dry storage space is available. Onion seed is very liable to damage by mice, which should be guarded against at all stages.

Onion seed threshes readily. Large quantities can be threshed on any type of threshing machine fitted with a peg drum. Lesser quantities may be threshed by flailing or by thorough trampling or beating of the heads in the curing bags. Small quantities can be rubbed by hand, or through sieves. In most cases threshed seed is passed through hand or mechanical sieves of No. 4 or No. 6 mesh, for the separation of large trash, and removal from the seed pods of any seed which has escaped the initial threshing.

Large quantities of seed should be machine winnowed, but small quantities may be winnowed by fanning or by exposure to a moderate wind.

Finishing.

Where considerable quantities of onion seed are being handled, machine dressing is usually adopted. For small quantities, and occasionally for larger quantities, a flotation method for separation of trash is often used. This method consists of immersing several pounds of the seed in a tub or bucket of water, and gently stirring for a minute or so. The sound seed will sink to the bottom of the container, but the trash and useless light seed will float on the surface, and may be skimmed off. The water is then carefully poured away, and sound seed is immediately spread out in a thin layer on boards or sheets of iron in the open, or in a well-ventilated shed to dry prior to bagging.

All onion seed should be finished by either one of these processes, as there is always a small amount of light, immature seed in any crop.

Viability.

The standard of germination set down by the regulations under the Victorian Seeds Acts provides that onion seed shall not be sold unless it gives at least 50 per cent. germination. If the crop is harvested at the correct stage, and the operations of curing and finishing are satisfactorily performed, there will be little difficulty in exceeding this minimum standard.

It is important to note that onion seed rapidly losses its power of germination, and its commercial life is approximately one year from harvest. It should be sold or used within that period.

Fig 5.—Hand sieving threshed onion seed for removal of large trash.

Marketing Tomatoes

Deputation to Minister

INTRODUCED by Mr. J. G. McDonald, M.L.A., a very representative deputation from the Northern Victoria and Bendigo Tomato Growers' Association, waited on the Minister of Agriculture (Hon. E. J. Hogan) on 17th December.

Mr. L. Pither (Shepparton East), President of the Association, said that those engaged in the tomato growing industry appreciated the fight Mr. Hogan had made in Parliament to enable orderly marketing of their product. The Bill had been amended to make it impracticable, by members who had no knowledge of the difficulties of primary producers. Tomato growers were alarmed at the prospect of another season such as last year, without some control of marketing. They hoped the Federal Government would give assistance and through the National Security Regulations bring about stabilization of the market, as has been done with last year's huge potato crop.

Manufacturers had refused to offer tomato growers any price. Eventually growers would have to take whatever the manufacturers offered or let the tomatoes rot on the vines.

He asked the Minister to urge the Minister of Commerce and the Price Fixing Commissioner to fix a price and appoint a committee similar to the Victorian Potato Committee, to control the marketing of tomatoes.

Mr. S. McKinnon, representing Bendigo Tomato Growers' Association, said growers in his district had suffered severely because of the increased cost of production and the low price obtainable under the open market. Unless something were done to fix a minimum price for tomatoes this year the industry would be ruined as far as Bendigo was concerned.

Mr. N. W. Fairless (Shepparton East) also spoke.

The Minister for Agriculture in reply stated that the Federal Prices Commissioner could fix only maximum prices. Last August he fixed the "maximum" price for potatoes at £6 a ton. In order that growers would secure the "maximum" price for potatoes a Committee was appointed to regulate supplies.

If Professor Copland agreed to fix a "maximum" price for tomatoes the tomato growers would require a similar organization to obtain that price.

Mr. Hogan said he was very disappointed with the amendment to the Bill which had been carried by the votes of the U.A.P. and the Labour party, and which had prevented tomato growers from enjoying orderly marketing of their product under the provisions of the Marketing of Primary Products Act.

He was prepared to do what he could to help them in any way they could suggest, but the "Open Market" was all that Parliament would sanction for tomato growers and the deputation had assured him that they were neither pleased nor satisfied with that.

Unsealed Potatoes

At the Court of Petty Sessions at Footscray, on 22nd December, 1941, H. E. Southwell, potato merchant, of 126 Geelong-road, Footscray, was convicted of a breach of section 7 (1) (*c*) of the National Security (Potato) Regulations.

Evidence was given to the effect that on 15th October, 1941, defendant had in his possession 43 bags of potatoes which were not sealed as required by the regulations.

Defendant was fined £2 with £2 5s. costs.

EROSION CONTROL

Methods in use at Dookie Agricultural College

By G. B. WOODGATE, B.A., Dip.Ed., Principal

A Preface by H. G. STROM, B.C.E., A.M.I.E. (Aust.), Chairman, Soil Conservation Board.

The general objects for which the Soil Conservation Board of Victoria was constituted include—the prevention and mitigation of soil erosion ; the promotion of soil conservation ; and the utilization of lands in such a manner as will tend towards the attainment of the objects aforesaid.

There should be no need to stress here the importance of these aims ; soil erosion in its various forms is in evidence over most of Victoria. In the last analysis, the work of controlling it must be done by the landholders themselves. Before incurring any large expenditure for erosion control work, however, a landholder will naturally ask what is the best way to go about it ; and he will prefer to use methods which have been proved successful in his own district or in others of a similar nature. While, however, soil conservation work has been carried out on a large scale in the United States, and to some extent in our neighbouring State of New South Wales, little has so far been done in Victoria.

The Board has therefore watched with keen interest the soil conservation works undertaken at Dookie Agricultural College, where methods of erosion control which have proved their worth elsewhere are being tested under Victorian conditions.

The importance of the College experiments lies in the fact that the problem at Dookie is the same as that confronting more than half the State—the safe disposal of storm-water. After a century of land use by the white man in Victoria, the position to-day is that when rain falls the water which does not soak in runs off more rapidly than it did under original conditions. This acceleration of run-off means that less water is absorbed by the soil to be available for plant growth, and, in addition, gives rise to a whole series of troubles—soil erosion, damage to roads, increased flooding, and siltation of dams, streams, and reservoirs.

The work at Dookie is intended to reverse this process, by slowing down the run-off so that as much rain as possible is trapped in the ground to increase plant growth, while the flow of any surplus water is controlled so as to do as little harm as possible. Conservation of water thus goes with conservation of soil.

Terracing and contour ridging mean some expenditure, but probably less per acre than the depreciation in value which has sometimes been caused in cultivation lands by a single heavy storm. Contour furrows are comparatively cheap to construct and should be very effective in reducing erosion over wide areas in Victoria.

I would recommend every landholder in those districts affected by water erosion to read Mr. Woodgate's valuable article on this important subject.

ON the Dookie College estate, the problem is one of water erosion. Erosion is a natural process, but, nowadays, when the term "soil erosion" is used, accelerated or excessive erosion is meant.

Soil erosion by water may cause loss of surface soil, in which case it is known as "sheet erosion," or it may cause the easily-recognized "gullying." Both sheet erosion and gullying are caused by the excessive and/or accelerated discharge of water from land on which rain has fallen. This discharge of unabsorbed rain water is generally termed "run-off." Run-off is obviously a perfectly natural happening and must be expected, but when, through any particular cause, it is excessive or too rapid, damage may be caused through sheet erosion or through gullying.

Surveying contour lines with the dumpy level.

Much has been said regarding the various methods of restoring water-eroded areas and of preventing further erosion damage, but it must be obvious that there is one fundamental, viz., the control of run-off. Not only must the aim be to prevent excessive run-off, but any run-off that does occur must be slowed down.

The work of erosion control at Dookie College may be described under two main headings, viz.:—

1. Control of run-off in—
   (*a*) Pastures.
   (*b*) Cultivated paddocks.
2. Treatment of gullies.

RUN-OFF CONTROL IN PASTURES.

Under natural conditions excessive and too rapid run-off is prevented by plant growth. On some farms, erosion has been stopped and the damage made good simply by inducing a thick growth of pasture, the resulting mat of vegetation proving ample protection for the soil and effectually preventing excessive discharge of water.

In areas of comparatively low rainfall, and in those having chiefly a winter rainfall, this protective vegetative cover cannot always be maintained and some artificial means of control has to be devised. In fact, where, for any reason, the cover is inadequate, such measures must be employed. Of these, the simplest and most promising seems to be the contour furrow.

Contour Furrows.

Contour furrows are formed by ploughing, across a slope, a number of furrows each on exactly the same level. Thus, in undulating country, these appear to twist and turn as each follows its own level.

Several writers on soil conservation refer to the value of contour furrows, but not many give useful advice regarding their construction. In "The Rape of the Earth," Dr. R. O. Whyte makes the following references:—"Probably more important is the effect of erosion control practices, such as contour trenches or furrows, on the run-off from hilly country, and thus upon the reduction of flood damage."—(In Wales.) "'The use of the contour furrow is, in fact, the brightest spot on the dark horizon of reclamation . . . I think the use of the contour furrow . . . will play a very great part in restoring South Africa's herbage and water supply'—(T. D. Hall)." In "Soil Conservation," H. H. Bennett states:—"Contour furrowing of range land has caused marked improvement of both the quantity and quality of the forage in numerous instances through the western grazing area."

Furrow Lay-out.

In developing a technique for the design and lay-out of a system of furrowing, the work at Dookie has been largely tentative and

Using the "A" frame to determine furrow lines.

Contour furrowing with the lister.
[Photo "Shepparton Advertiser."

experimental. It is obvious that the chief determining factors are:—

1. The physical character of the soil.
2. The fertility of the soil.
3. The amount and character of the vegetative cover.
4. The slope.
5. The incidence and intensity of rainfall.

For success it would appear necessary that:—

1. The furrow should be dead level. They are merely retention and absorption furrows. Any inaccuracy in surveying or in the ploughing can be guarded against by placing earth blocks in the furrow about a chain apart, or even closer, but, with reasonably accurate surveying and ploughing, these blocks appear unnecessary. In ploughing, it is sometimes necessary to go off the contour to miss a tree or other obstruction; in such a case blocks must be put in.

2. The furrows should be of large cross-section, say, a minimum size of 48 square inches. The method has sometimes been condemned because of failure due to the use of too small a furrow.

3. They should be correctly spaced so that unabsorbed rainwater which runs off the space between the furrows is collected in the next furrow below.

In determining the lay-out for any particular paddock, the slope of the steepest portion, as well as the average slope, is determined. From this information the spacing of the furrows is decided upon. Thus, if a paddock has a fall or slope of 16 feet in 100 feet, it is said to have a 16 per cent. slope. On this slope, the contour furrows are ploughed 25 feet apart; there is thus a vertical drop of 4 feet from furrow to furrow. This vertical interval of 4 feet is maintained on slopes ranging from 20 per cent. to 14 per cent. On less steep slopes a 4-ft. vertical interval results in the furrows being too far apart. For the present, a horizontal distance of 30 feet between furrows has been fixed as a maximum. With a wider interval, the furrow may be unable to cope with the run-off. Where for any particular reason the run-off is too great for the furrow, intermediate furrows are ploughed.

Apparently the spacing at Dookie is rather wider than that frequently adopted overseas; in many districts it may be found advisable to plough the furrows nearer to each other. Only by research into the influence of the five factors mentioned above can a sound basis for spacing be determined.

CONTOUR FURROW SPACINGS AT DOOKIE COLLEGE.

Percentage Slope.	Vertical Interval (Feet).	Horizontal Distance (Feet).
20	4·00	20·00
19	4·00	21·05
18	4·00	22·22
17	4·00	23·53
16	4·00	25·00
15	4·00	26·67
14	4·00	28·57
13	3·90	30·00
12	3·60	30·00
11	3·30	30·00
10	3·00	30·00

NOTE.—Maximum Vertical Interval—4 feet.
Maximun Horizontal Distance—30 feet.

Ploughing contour furrows.

The picture illustrates how contour furrows are taken around obstructions—always on the uphill side.

Surveying the Furrow Lines.

The spacing having been decided upon, the next step is to mark out the lines which are to be ploughed. At Dookie, the dumpy level and staff were mostly used, but some of the work was done with the "A" frame. When checked with the "dumpy", the latter method proved sufficiently accurate. Every line was surveyed, but some people hold that this is unnecessary. They claim that only every second or third furrow need be surveyed, the others being run by the eye.

It is advisable to mark the first line by driving pegs in at intervals of, say, 15 yards. In the next line, pegs may be much wider apart, but every 15 yards or so the line should be marked with a hoe or mattock. This effects an economy in pegs and also enables the operator to distinguish between the various levels. It is remarkably easy to run unintentionally from one line to another. Painting the tops of the pegs in different colours is helpful in keeping the operator on the right line. (When the ploughing is being done, a pilot often goes ahead on foot or on horseback.)

In pegging out with the dumpy level, it has been found advisable to have three men—one at the level and the others driving pegs or marking with the mattock. With one setting up of the level, several lines may be marked.

The surveying is always commenced at the top of the slope, as is also the ploughing. Heavy rain may occur before the job is completed and if furrows are ploughed near the bottom, they may be ruined by the run-off, but if the furrowing is at the top, no harm will be done.

Ploughing the Furrows.

Though some writers advocate ploughing more than one furrow at a time, at Dookie only single-furrow implements have been used. These have been of various types, with the result that there are examples of various types of furrow. When the work was first attempted, the soil was dry and hard. A disc plough of the hillside type was tried, but, as the soil was also very stony, it was ineffective. A heavy road plough drawn by a tractor proved very satisfactory, the ploughing being done in one direction only, and the sod being thrown downhill. Experiments have been made with an extension to the mould-board, the idea being to throw the sod further away from the furrow, thus providing a much wider channel for the retention and absorption of water. Other types of single-furrow plough have been tried, with varying results according to the character of the soil and its hardness, but the road-plough has never failed to make a satisfactory furrow, even on stony hills of most forbidding appearance.

Contour-furrowed pastures.

Constructing contour banks in a cultivation paddock.

Experiments have been made with ploughing both ways, the result being that every second furrow has the sod thrown uphill. Under some conditions this may provide sufficient protection, but it is certainly more difficult to form the sod into a continuous bank. Also there is always the risk that the sod will wash into the furrow and silt it up.

Another implement which has been tried is the lister or middle-buster. This throws the sod on each side of the furrow, but, by putting a "set" on the lister, more soil can be thrown downhill than uphill. This implement can be used in both directions. When the lister would not penetrate hard patches, a "rooter" was devised. This proved most effective, for, after its use, the lister readily entered the soil, but, of course, two operations were necessary. However, with the tractor and lister unit, these two operations proved less costly than ploughing one way with the road-plough. In most soils the lister will make a furrow of greater cross-section than that made by the plough.

Some Furrowing Problems.

In surveying the furrow lines, depressions present various problems. In crossing wide shallow depressions, it is wiser to follow the true contour, but the furrow line should be carried right across narrow depressions, these depressions being blocked at the furrow line by a block *higher* than the bank of the furrow.

Old roadways may cause trouble. Usually they are worn or washed to a level lower than that of the surrounding country, while they have a dense, tightly-packed surface which is not only difficult to plough, but which also provides 100 per cent. of run-off. At Dookie the furrows are carried right across tracks, the ploughing being done after rain. Intermediate furrows are also ploughed. Earth is carted and the furrow banks are built up to a higher level than those at each side of the track.

Results of Furrowing.

Contour furrowing was commenced at Dookie College on 24th December, 1940. This date is significant for, on 3rd January, very heavy and continuous rain tested the furrows thoroughly. They proved completely effective in preventing run-off. Gullies in un-furrowed areas ran "bankers", but those below furrowed paddocks were empty except for local drainage. Further heavy rain in March provided a further test which confirmed the observations made in the January rain.

The retention by the furrows of water which otherwise would have run off, resulted in an increased growth of pasture. This was most striking and no one who saw it could fail to be impressed. Indeed one landholder, who visited the College, later announced that, although he

Oat crop on a contoured paddock. The lines of the banks may be seen distinctly.

Right—Ploughed-in gully; Left—Gully allowed to remain untreated for observation purposes.

had no erosion troubles, he would contour-furrow his pasture to retain water on the land, and thus promote an increased growth. It cannot be too strongly stressed that contour-furrowing should be accompanied by vigorous effort to promote pasture growth.

Furrow Maintenance.

Undoubtedly furrows tend to silt up, the banks subside and vegetation covers both furrows and banks. In this way, both holding-capacity and absorptive-capacity must be reduced (hence the need in the first place for a large furrow), but it is expected that, concurrently with this process of reduction, there will develop on the land a better vegetative cover induced by the retention of water which formerly ran off. This vegetative cover should more than make up for loss of furrow efficiency.

The real test will come when, after a space of years during which the furrows and their banks become "stabilized", a drought is followed by heavy rain. However, should the furrows become ineffective and the vegetative cover prove inadequate, it would be a comparatively simple matter to plough fresh ones. There would be no need for a survey, as the line of the old furrows could be used as a guide.

It is obvious that a system of pasture furrowing should be accompanied by wise pasture management, a conservative policy with regard to stocking and the conservation of fodder. In this way, over-grazing with the consequent destruction of vegetative cover can be avoided.

It should be noted that a certain amount of maintenance work is necessary. The bank formed by the turned-up sod is an important part of the water-holding "furrow". If this bank is broken down, a large quantity of water may be discharged, particularly if there are no "blocks" in the furrows. In this respect, sheep tracks are the greatest trouble, but an occasional patrolling is sufficient to deal with them. All weak spots should be protected by blocks. Sometimes the term "contour drains" is used to describe the furrows. This should be avoided as the purpose is to retain water on the land and not to discharge it. This absorptive function should be emphasized at all times.

Many objections have been raised. It is said that ewes will get down in the furrows, that they constitute a danger in mustering, that they cut through tracks and spoil them and that gateways become useless. It has been found that the more serious of these fears are groundless. It is a fact that tracks have to be re-designed and taken mostly along the contours, gates have to be moved to correspond to the new layout and, in some cases, even fencing has to be altered, but, in the long run, these are found to be advantages. In any case, where the alternative is ruin of the property through erosion, these difficulties do not loom so large.

Cost of Furrowing.

The cost varies somewhat from paddock to paddock; probably in no case is it higher than 8s. per acre. In the particular paddock in which this figure was arrived at, there are 38 acres. Two-fifths of the area is a stony, timbered hill, the remainder being moderately stony. It was found necessary to break open the furrows with the "rooter" before furrowing with the lister.

If one man were dispensed with in surveying and if no pilot were used, the outlay would be reduced, but the work would go on more slowly. Again a farmer may reduce the outlay by doing his own surveying.

The total tractor costs were just under 2s. 6d. per acre; this includes depreciation, the outlay for fuel and oil being 1s. 2d. per acre.

Details of cost are—

Wages.

	£	s.	d.	£	s.	d.
Surveying and Pegging Furrow Lines—						
1 man—3 days at 20s.	3	0	0			
2 men—3 days at 10s.	3	0	0			
Furrowing—						
Driver—4½ days at 15s.	3	7	6			
Pilot (part-time)—						
2½ days at 10s. ..	1	5	0			
Total wages				10	12	6
Tractor—						
Depreciation, fuel, and oil ..				4	14	0
Total cost				15	6	6

Cost per acre = 8s. (approx.).

RUN-OFF CONTROL IN CULTIVATED PADDOCKS.

Run-off from bare fallow is very much greater than that from similar soil (on the same slope) under good pasture and there is still a difference even when the land is under crop. This difference is accentuated whenever land which is liable to erode is cultivated up and down a slope. In such a case, all cultivation should be carried out on the contour. In some instances this may give sufficient protection, but generally some other measures are necessary. It is here that the contour bank or broad-base terrace has its use.

Contour Banks (Terraces).

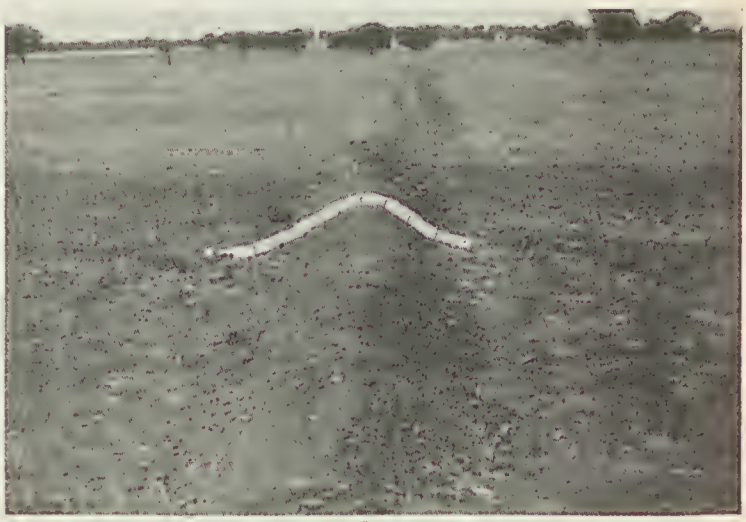
Contour banks or terraces have to be further apart than contour furrows to give room for cultivation between them, and also because of the cost of construction. This means that the bank must hold back much more water than the furrow. In heavy rainfall the accumulation of water may be too great for the bank to hold. To guard against this, the banks are not constructed on the true contour, but are given a fall to one or both ends to allow a volume of water to be discharged. To ensure a maximum absorption, the first few hundred feet of the bank are dead level; after this it is given a gradually increasing gradient. The banks therefore combine both functions—absorption and drainage.

Heavy rains in March, 1941, caused rather severe damage to a college paddock known as McPoyle's No. 4; consequently this was the first paddock to be treated. It has an average cross fall from north to south of 62·5 feet in 1,016 feet or approximately 6 per cent. The vertical drop between banks was fixed at 5·4 feet, which gives a horizontal distance of approximately 90 feet.

The banks are of broad-base type. They run approximately east and west and have a variable grade. They were constructed with a blade grader and a delver drawn by a tractor, the soil being taken from both uphill and downhill sides, but from the latter only in sufficient quantity to shape up the bank. The height is approximately 15 inches and the removal of soil from the uphill side thus forms a shallow channel approximately 20 feet wide. Starting from the northern side of the paddock the first six banks discharge towards the west, but the remainder discharge both ways.

As the banks were, to some extent, experimental, different gradients were tried out, but, in no case, is the slope more than 4 inches per 100 feet.

At the ends of the banks, the channels are "fanned out", that is, made as nearly level as possible; this is to spread the water as much as possible on discharge, so that it will enter the waterway without any tendency to scour.



Ridge across a ploughed-in gully to prevent possible scouring before pasture has grown.

McPoyle's No. 4 is sown with oats. The banks were sown with the drill, and the balance with the combine on the contour.

Cost of Terracing.

The men who constructed the terraces were quite inexperienced in this work, but, as was to be expected, the rate of progress increased as the work went on. Because of the initial period of slow work, the cost was a good deal higher than the anticipated cost of future work. Approximately 4¼ miles of bank were formed, the ends being made up with the buckboard and "fanned out" for an outlay of approximately £40 in wages, keep, fuel and oil. The area of the paddock was 49 acres.

There are so many factors influencing costs that it is expected that even on the same property there will be appreciable variations.

Preparation of Waterways.

The water discharged from the ends of the contour banks cannot be allowed to run away indiscriminately, for it is obvious that severe erosion may be caused. Some form of protected outlet must be provided. Of the many forms of water outlet which suggest themselves, probably the most suitable and the most useful is the grassed waterway, in which a gradual slope is well-protected by a mat of pasture.

At the western end of McPoyle's No. 4, the adjoining paddock provided a ready-made grassed waterway for the discharge from the variable grade terraces, but it will be necessary to construct a continuation of this. Graded grassed waterways were also necessary to take the discharge from the eastern end of the banks. One such waterway has been constructed in paddock McPoyle's No. 2 running from north to south down a gradient of 4 per cent. In the making of this waterway, a gully had first to be filled. As completed, the waterway is 35 feet wide and, being dead level in cross section, it resembles an irrigation bay. Strips of kikiyu sod have been placed across the waterway at intervals and the whole has been sown with a mixture of grass and clover seed.

Contour Ridges.

Some of the college cultivation paddocks are subject to only slight erosion. In these, ridges are formed on the contour and all tillage operations between these ridges are carried out on the contour. To avoid undue concentration of run-off, the ridges have to be closer together than terraces. Where they cross narrow depressions, the ridges should be strengthened and raised higher than on either side. This is done so that if water accumulates to such an extent that it "tops" the bank, the overflow will not rush down the depression and form a gully.

Bag check-dams.

In one paddock the ridges were formed by crowning up with a large single-furrow plough attached to a tractor. In another, they have been formed with a four-furrow plough and light (two-horse) blade grader.

When the paddocks are in stubble and are being used for grazing, it may prove advisable to run contour furrows between the ridges, no survey being necessary, as the ridges will be sufficient guide.

The results of this experiment are being watched with great interest. If it is a success, a cheap method suitable for many cultivated farms will be available.

Check-dam made of unsawn timber and old iron. Note manner in which it is let into sides of gully. Note also the "apron" of logs to break the overflow.

The deep-rooted custom of cultivating parallel to fence lines leads, sooner or later, to working directly up and down a slope. In heavy rain the furrows which run downhill become channels which accelerate run-off and frequently cause erosion. On the other hand, if all cultivation is carried out on the contour, the furrows are level and are across the slope. Each one tends to arrest run-off and to conserve moisture.

It is yet too early to give reliable information regarding contour cultivation at Dookie, but it may be said that the method presents no great difficulties. It does not lend itself to the production of the neatly finished work of the expert ploughman, but it has many advantages. Research in U.S.A. has shown that contour cultivation requires less tractor fuel than the conventional method. One New South Wales farmer who works only on the contour declares that he now uses one horse less per team. This will be readily understood when it is realized that when working on the contour, there is no uphill climb.

In U.S.A. there is also some evidence of increased yields from land cultivated on the contour.

GULLY TREATMENT.

The treatment for gullies most generally recommended by writers on Soil conservation is the construction of check dams across them. In 1939, wire-netting checks were placed in several gullies at Dookie, and, although experience has shown that their design can be improved upon, they caused considerable deposition of silt. In constructing any type of check dam, care should be taken to see that the design tends to bring the flow of water to the middle. Frequently, check dams check the flow too effectually, causing water to swirl to the sides where it widens the gully and goes round the end of the dam.

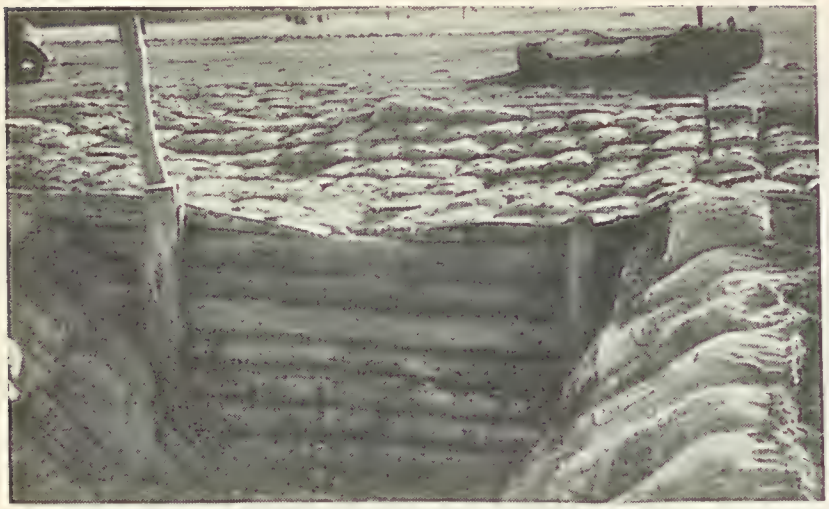
Because of the efficiency of contour furrowing, check dams occupy only a minor place in the college programme; they are used chiefly to slow down the flow in depressions which have to carry a stream of water after rain.

In shallow depressions, sand-bags are used, the top bags containing soil to which grass seed has been added. When the seed germinates, the sole of grass helps to form a solid sod. In these depressions, stone checks have also been used successfully. Probably the cheapest and most effective type of gully check is one made of "bush" timber and old galvanized iron.

Diversion of Dam Overflow and Gully Flow.

In paddock No. 25, the overflow from the dam caused a nasty scour. To take and spread this overflow, a contour bank with a slight gradient has been constructed around the brow of the hill, so as to discharge the water slowly on to a grassy spot.

A smaller bank has been constructed further down the gully to dam the gully and spread any flow which may still come down it.



Plugged gully-head. Note the log retaining wall and the "sodding" with bags of soil containing grass seed.

These banks have been allowed to grass over before bringing them into use. In connexion with this work a system of interrupted contour banks may be helpful.

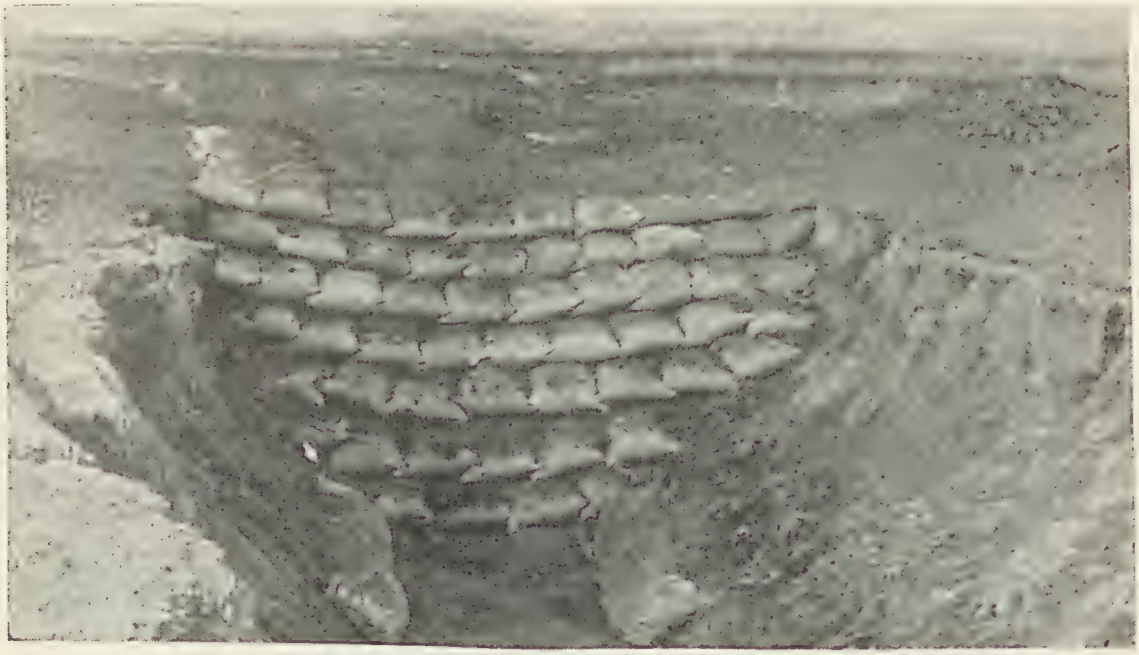
Ploughing-in of Gullies.

When the slope above the gully is furrowed, there is no longer sufficient run-off to provide gully-flow or to cause further gullying. It is found that, under these circumstances, the gully commences to "heal" or to "become stabilized", that is, vegetation commences to grow on the bottom and even sometimes on the sides. The vertical, or nearly vertical, sides will not grow pasture, and usually there is also a bare margin alongside the gully. By breaking down the sides and grading the soil into the scour, a wide shallow depression is formed. The depression is sown down and when it grasses over, there is very little evidence of there ever having been a gully at that spot.

An effective and cheaper method is merely to break down the steep sides into a more gentle slope or "batter".

Plugging Gully Heads.

The flow of water into the head of the gully, causing it to cut back, results in the gradual development of the gully up-hill. Until run-off is controlled by furrowing, serious damage may be done. As this was the position in several paddocks at Dookie, it was decided that the first step would be to plug gully-heads. The soil which was used to fill the cavity was held in position either by a log dam or by



Plugged gully-head "sodded" with bags of soil.

bags filled with soil, the surface being "sodded" with bags of soil in which grass seed was mixed. Owing to the very dry season, germination of this seed was delayed, and, when it did occur, the young grass was quickly eaten by stock.

Experience has shown that the sodded area should be protected from stock. It has also shown that, under the conditions which have been experienced, the plugging provides only a temporary protection. It is very probable that, if the sodded area were protected and a prolonged period were to follow in which there was little or no concentration of water in the gully, the plug would be effective for many years.

CONCLUSION.

It does not necessarily follow that measures which are successful at Dookie will be effective on any other particular property. However, there are many districts with similar erosion problems and approximately the same annual rainfall (21 inches). Since the control measures used at the college are based on sound overseas practice and since these in turn are based on the fundamental principle of control of run-off, it is obvious that they must have a wide application. Soil erosion is not merely a threatened menace to our national economy; it is very real and active. Every possible effort should be made to arrest the destruction of soil which is going on so rapidly, and to repair the damage which already has been done.

The Foot or Leg Louse of Sheep

By W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

RECENTLY a number of sheep have been found in various markets in this State to be affected with the foot louse.

The foot louse (*Linognathus pedalis*) is a sucking louse, and although not nearly as common as the red-headed or body louse (*Trichodectes Sphærcephalus*), now known as *Bovicola ovis*, it is more difficult to eradicate.

The foot louse is about twice as long as the body louse, being up to 1/12th of an inch in length. It has a short, blunt head, and a wide, oval-shaped body, blue-grey in colour. As its name implies, it is found mainly on the hairy portions of the legs and adjacent parts, particularly around the coronets. In severe infestations it has been found on adjoining woolled parts.

The sheep foot louse (Linognathus pedalis).

The young foot lice begin to lay eggs when about twelve days old, and the eggs hatch in ten to eighteen days.

Very often foot louse infestation is comparatively slight, and in some cases only 2 or 3 per cent. of sheep are found affected in a line. It should be realized, therefore, that unless every sheep is carefully inspected—each examination takes about five minutes—some infected sheep may escape detection.

It is essential to treat sheep for foot lice at least twice, at intervals of ten to fourteen days, and they should remain in the bath for five minutes to ensure that they are clean. Complete immersion is not required unless there is evidence of the presence of lice on the head or body. The bath should be deep enough to cover the infested parts as the sheep stand in the dip.

The foot louse is rather resistant to arsenical and carbolic dips so usefully employed in body louse eradication, and one of the recognized sheep dips containing *derris* or *rotenone* should be used for this purpose.

Foot lice are scheduled under the provisions of the Stock Diseases Act, and any owner failing to report the presence of foot lice in his sheep is liable to prosecution. All properties on which infested sheep have been grazing are quarantined. Infested sheep must not be exposed for sale.

Superphosphate Rationing

OWING to enemy action, supplies of phosphate rock, and therefore of superphosphate, are greatly restricted, and the Commonwealth Government, after consultation with the manufacturers, has decided to ration superphosphate to all consumers on a uniform basis, irrespective of the crop or pasture on which the manure is used. From 1st January, manufacturers are prohibited from delivering to each consumer more than 60 per cent. of the quantity of superphosphate sold to the consumer in the year ending 30th June, 1940, which, for the purpose of rationing, is regarded as the base year. To meet requirements of special cases, each manufacturer will be required to set aside in a Contingencies Pool a proportion of the quantity of superphosphate sold by him in the base year 1939-40, and the Department of Agriculture has been appointed by the Commonwealth Government to administer the distribution of the superphosphate in this Contingencies Pool and to decide any doubtful cases.

In allocating the superphosphate in the Contingencies Pool, the following special cases will receive consideration:—

(*a*) Where purchases by any user of superphosphate in the base year 1939-40 were below normal.

(*b*) Where, although phosphate is normally used, none was purchased in the base year.

(*c*) The Department is authorized to grant supplementary rations for special crops necessary for the effective prosecution of the war, e.g., flax, and to grant a ration to persons who do not ordinarily use superphosphate, provided that there are special circumstances this season which warrant the granting of a ration.

Except in the case of flax, where the Department is prepared to authorize immediate delivery of superphosphate out of the Contingencies Pool, obviously it will not be possible to authorize the distribution of the superphosphate in other special cases mentioned until sufficient applications have been received to enable the Department to determine whether each consumer's total extra bona fide requirements can be met, or whether it will be necessary to make a *pro rata* distribution.

The procedure to be adopted is as follows:—Growers will order their superphosphate in the ordinary way from their usual suppliers not later than 31st January, 1942. They will then be advised by the manufacturer or reseller as to the quantity they may receive immediately, that is, their basic ration, namely 60 per cent. of the quantity they purchased in the base year 1939-40. If they come within the scope of the special cases set out above, they should then apply to the Superphosphate Section, Department of Agriculture, 61 Spring-street, Melbourne, setting out reasons why they should receive a ration from the Contingencies Pool.

As the plan requires that all cases for consideration must be finally dealt with by 7th February, it is essential that orders for superphosphate should be lodged immediately, so that farmers may ascertain their position.

Farmers are urged to order their basic ration now.

Fertilizer Registrations and Unit Values for 1942

Owing to circumstances arising out of the rationing of superphosphate, the List of Registered Fertilizers and Unit Values which, in previous years, has been published in the January issue of this Journal, will not appear until February.

Pasture Plants of Victoria

6.—Cocksfoot (*Dactylis glomerata*, L.) Timothy (*Phleum pratense*, L.)

By W. D. ANDREW, M.Agr.Sc., Assistant Agrostologist.

This is the sixth of a series of articles presented in simple form to enable members of Young Farmers' Clubs and others to obtain an elementary knowledge of the pasture plants of Victoria. Previous articles appeared in this Journal as follow:—1. The Rye grasses (February, 1941); 2. The Canary grasses (June); 3. Weeping grass, Scented Vernal grass, and Veldt grasses (October); 4. Barley grasses (November); 5. Foxtail grasses (December). An explanation of botanical terms used will be found at the conclusion of this article. For descriptive illustrations of botanical terms, readers should refer to previous articles.

Cocksfoot (Dactylis glomerata, L.)

COCKSFOOT was first cultivated as a pasture grass in Virginia, America, about 1760. In that country it is known as orchard grass. From America it was taken to England and, no doubt, came from there to Australia in the early days of settlement.

Of the many pasture plants introduced into this country, cocksfoot is one of the most useful. It is now widely distributed in the southern part of Australia, mostly in the cooler districts, where the better rainfall conditions prevail.

The botanical name of this grass is derived from the Greek *dactulos*, meaning a finger. It alludes to the stiff branches of the inflorescence. *Glomerata* refers to the clustered spikelets. The vernacular name arises from the supposed resemblance of the inflorescence to a fowl's foot.

Agricultural Features.

Where the annual rainfall exceeds 30 inches, or irrigation is available, cocksfoot is usually sown in the pasture mixtures. On the flats it ranks second in importance to perennial rye grass, but on much of the hill country it is the more useful species, as it often persists where the other species fails to maintain itself. This can be attributed mainly to the deep-rooting habit of cocksfoot and its ability to grow satisfactorily on looser, drier, and less fertile soils than perennial rye grass.

Cocksfoot (Dactylis glomerata, L.)

[*After Hitchcock.*

Although possessing resistance to dryness, cocksfoot cannot attain its maximum growth unless moisture is available during the warmer part of the year, and consequently is of limited value for grazing in places where dry conditions prevail from November onward.

In Victoria, suitable conditions for cocksfoot are to be found in Gippsland and the southern Western District, in the more favoured parts of the river valleys of the North East, and in the irrigation areas.

Cocksfoot is a perennial, but is relatively short-lived if persistently closely grazed, so that it is better suited to larger grazing animals than to sheep. These nip off the plants close to the ground and expose the crowns to the sun. This grass grows best if the base of the plant is shaded such as occurs when the plants are protected by lenient grazing. If allowed to make unrestricted growth in the late spring cocksfoot becomes rank and tussocky and deteriorates in grazing value, while it crowds out other useful pasture plants. A repetition of this management soon produces a cocksfoot dominant pasture.

To obtain the best grazing from cocksfoot it should be kept moderately short to promote leafy growth and to allow other species, particularly the clovers, to develop and intermingle with the cocksfoot to form a mixed pasture.

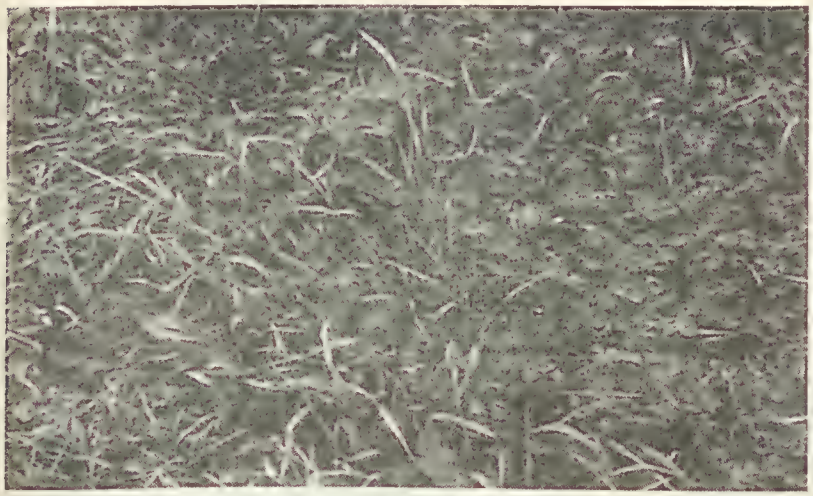
Cocksfoot makes a good showing in the autumn, but its winter growth is poor. Its spring growth, although belated, extends well into the following autumn if moisture is available, and because of this extended growing period it is particularly useful to the dairy farmer.

This grass is well suited for making into hay as it grows to a height of 2 to 3 feet and cures well, while it can be ensiled with equally good results. It usually makes good aftermath growth in late December and January.

Cocksfoot is sown generally with such species as perennial rye grass, subterranean, red and white clovers. Seeding can be undertaken at any time from the autumn until the spring, although best results are achieved when the seed is sown on a moist warm seed bed. Careful preparation of the soil to reduce weed competition is beneficial, and shallow sowing is desirable. If the seed is showing on the surface after sowing, a light harrowing can be given, otherwise no further treatment is necessary.

Cocksfoot attains its maximum production in the second or third season if sown with clover only, but if associated with perennial rye grass, and conditions are suitable for this species to make strong growth, cocksfoot usually develops more slowly and less vigorously.

A typical scene in the hill country of Gippsland where cocksfoot is an important pasture grass.



A mixed pasture containing cocksfoot. Note the way in which the cocksfoot mingles with the other species.

Rates of sowing cocksfoot seed vary from about 4 to 15 lb. per acre, according to conditions and how much of the grass is required in the mixture.

Many types or strains of cocksfoot occur. These range from the short-lived and stemmy early-maturing hay strains to the long-lived, later-maturing, leafy ones. In the latter class, which represents the best type of grazing plant, one would include the cocksfoot, which has persisted in the old pastures in Gippsland and in the Akaroa district of New Zealand. The short-lived and inferior type for pasturage is typified by the Danish cocksfoot, of which, unfortunately, quite a large amount has been imported on account of the cheapness of the seed.

Harvesting the Seed.

The harvesting of cocksfoot seed in this State so far has been carried out on a limited scale only, but the seed produced is generally of good quality, and because it represents a good strain, should command a better price than it sometimes does.

Areas for the collection of seed need to be protected for several months before harvesting, as the flowering shoots form early and develop slowly. Harvesting may be begun when the heads turn a golden-brown colour, and at this stage a few seeds will fall out of the heads if they are lightly shaken or bent across the hand.

Small areas are usually cut with a sickle, and large paddocks with a reaper and binder or a mower; with hand cutting one obtains a cleaner sample but, of course, this practice has limited application. The sheaves are usually allowed to cure in the field, after which they may be threshed by flailing or with an ordinary threshing machine. Coarse rubbish is removed from the sample by sieving, and afterwards the finer material is taken out by an appropriate seed-cleaning machine, which blows out the light chaffy portions and separates the various seeds according to size.

The practice of shutting up cocksfoot pastures for seed usually encourages the growth of fog grass (*Holcus lanatus*, L.), and this is the commonest weed seed impurity that has to be removed during cleaning. Another difficulty is the presence in the sample of small clusters of "seeds" of which some are infertile, and these

On the left is a typical hay strain of cocksfoot.—Note the high proportion of stem to leaf. On the right is a grazing strain. It has fewer heads and a more leafy growth. [*After Armstrong.*

occur in greatest amount when the grass is not properly cured before threshing or this is carried out during cool weather.

A bushel of cocksfoot seed weighs from 15 to 20 lb., and in Australia the standard weight in the trade, by agreement between merchants, is fixed at 20 lb. The number of seeds in a pound is very variable, and ranges from about four to six hundred thousand.

a.—An inflorescence of cocksfoot showing clustered spikelets near the ends of short rigid branches.

b.—A single spikelet consisting of four florets shielded by two outer glumes.

c.—A single floret showing the lemma on the right and the palea on the left. Stamens and ovary are within these two flowering glumes.

Identification.

Cocksfoot is a perennial bunch grass with a deep-rooting system. In vigorous plants this may extend to a depth of more than 3 feet, but 50 per cent. of the roots would be in the top 12 inches. Plants weakened by overgrazing may have quite a shallow root system, and consequently can be pulled out quite easily. This grass does not spread by runners, but in the absence of competitive growth it forms dense clumps which enlarge laterally as the plants age. In protected places the plants grow to a height of 2 to 3 feet. The foliage is usually a dull green colour, is free of hairiness, and the leaves have a fine saw-like edge, but this is visible only if they are examined with a lens. There are numerous fine veins above and below, and a prominent mid-rib on the underside of the leaf blade.

Stems are flattened, and the young shoots are folded. These are important distinguishing features, as cocksfoot, toowoomba gr. (*Phalaris tuberosa,* L.), timothy, and prairie grass (*Bromus unioloides,* H.B. and K.) in a mixed pasture are often very similar during the vegetative stage, but these other species have rounded stems. The ligule is about ¼ inch long, white and semi-transparent, and at the junction of the blade and sheath of the leaf there is usually a cream-coloured band across the leaf.

Indivdual plants vary greatly in the size of the leaf and the proportion of leaf to stem. Those which are good grazing types usually produce fewer seeding heads than the hay strains which, on account of having a high ratio of fertile to sterile or leafy shoots, are heavier seeders.

In Victoria, the inflorescence in cocksfoot appears about November. It is a panicle with the spikelets in one-sided clusters borne near the ends of rigid branches. At first these branches are pressed up against the rachis giving the head a dense, irregular appearance, but when the florets become ready for pollination the arms of the panicle spread out. After fertilization has taken place, the inflorescence again assumes a more or less contracted habit.

Each cluster in the head consists of about five spikelets, and as these are close together and almost stalkless it is rather difficult to recognize the various parts of the cluster. Individual spikelets are made up of three to five florets shielded by two outer glumes, each glume

being about ¼ inch long, semi-transparent, with a prominent dark-green mid-rib bearing fine bristles and tapering off to a sharp point. The larger glume of the floret or lemma as it is called, is a little longer than the outer glumes of the spikelet, has five prominent dark-green veins, and tapers off to a forked tip, and bears a short terminal awn. It is keeled, and carries fine bristles along the mid-rib. The inner smaller glume (palea) is almost transparent, is flat, and has two lateral green veins. Between the palea and lemma are the ovary and the stamens.

At maturity the axis of the spikelet (rachilla) fractures above the outer glumes and the florets fall singly, or in groups of two or three attached to a small portion of the rachilla, while the outer glumes remain attached to the arm of the inflorescence.

A variegated form of cocksfoot is occasionally cultivated by gardeners as a border plant, and some other varieties which have attracted attention are as follow:—

var. *hispanica*—having short branches in the panicle.

var. *maritima*—with a dark-violet panicle.

var. *pendula*—having a loose drooping panicle.

var. *abbreviata*—with a compact panicle.

var. *ciliata*—having hairy leaf sheaths and hairy lemmas.

Timothy (Phleum pratense, L.).

A native of Europe and Northern Asia, "Timothy" is of limited importance in Victoria, although in parts of the Northern Hemisphere it is cultivated extensively for pasture and hay. This grass is named after one Timothy Hansen, who is said to have introduced it into the State of Maryland, in United States of America, about 1720. It is also known as Meadow Cat's-tail and Herd's grass.

Timothy was recorded as naturalized in Victoria in 1887, so that it must have been introduced before this date, but despite its period of domicile it has made little or no headway in this State.

The name *Phleum* is derived from the Greek *phleos,* which is an old name for a marsh reed, while *pratense* comes from the latin "pratensis," meaning growing in meadows.

Timothy grass (Phleum pratense, L.).
[*After Hitchcock.*

Agricultural Features.

Timothy is best suited to moist, cool conditions, where soil fertility is good.

Left.—Young Timothy plant showing lateral shoots developing near the base.
Right.—Root system developed on lateral shoot and main shoot has ceased growing.
[*U.S. Dept. Ag. Bull.* 1450.

In Victoria, trial sowings of this grass have been made in a number of places where such conditions prevail, but generally its performance has not been impressive, and better pasturage has been obtained from such species as cocksfoot and golden crown grass (*Paspalum dilatatum*, L.) under the same conditions.

Timothy commences active growth in the late spring, and its period of maximum vigour corresponds to the drier part of the year when temperatures are high. Its winter production is poor.

Although this grass persists from year to year it is not a true perennial, for entirely new plants develop each year by a special means of vegetative reproduction.

In the late spring, lateral buds at the base of the stems elongate into shoots, each of which develops an independent root system, after which the old shoot gradually withers and decays, leaving numerous new plants linked together by dead tissue. What appears, therefore, to be a crown of timothy, is really a community of young plants. These are not close enough to form a dense bunch of green leaves, but their proximity is such that they usually prevent other species from gaining a foothold between them. Such community patches are often 1 to 2 feet across on good soils, but in less favoured places one finds only scattered plants persisting.

Of the new shoots which develop in the late spring, some produce heads the following spring, while others are sterile and form only leaves. Sterile shoots continue to form leaf until checked by climatic conditions, but fertile shoots produce very little leaf after the flowering heads appear.

When the florets of timothy bloom, the anthers emerge first and then the stigmas, and although plants are mostly cross fertilized some self fertilization can take place.

Timothy may be sown down satisfactorily with or without a cover crop, the former method being the cheaper. Rates of sowing are about 15 lb./ac. if sown without other grasses or clovers, or 4 lb. if sown in a mixture. Autumn sowing is usually the best, but seeding can be undertaken in the spring with quite good results.

If timothy is to persist in the pasture, lenient grazing is essential, and as it is very palatable it is short-lived if the grazing is not carefully regulated. Like cocksfoot, it is more suited to cows than to horses or sheep.

Timothy is a good hay plant, and for best results it should be cut just before the heads emerge. In America, large quantities are harvested each year, and it is used as a standard of quality in commerce, other types of hay being evaluated in terms of Timothy hay.

The proportion of fertile to sterile shoots produced by individual plants varies, and this finds expression agriculturally in the distinction between a hay strain and a grazing strain, the former having a high proportion of flowering shoots to leafy shoots, and the latter, the reverse.

A good deal of plant selection has been carried out with timothy, and numerous leafy grazing strains have been isolated and propagated.

A comparison between two strains of Timothy grass. Left—An upright stemmy hay strain. Right—A leafy grazing strain. [*After Armstrong.*

Harvesting the Seed.

Seed is usually harvested with a reaper and binder, but paddocks may be stripped or the seed taken off with a header. Timothy is ready to cut for seed with a binder when the heads and upper parts of the stem turn from green to yellow, and the seed is commencing to shed at the tip. At this stage the flower glumes should have a silvery lustre, and some seed should drop from the head if knocked against the hand.

Sheaves are usually cured in the field, and subsequently threshed in much the same way as is cocksfoot. Yields of seed range from about 3 to 5 hundredweight per acre, according to conditions, and there is roughly a million seeds to the pound. A good sample of seed should be plump, bright in colour, and should not contain

This shows successive stages of flowering in the head of Timothy grass. Flowering commences at the top and usually a week elapses before florets at the base bloom.

[*U.S. Dept. Ag. Bull.* 1450.

many hulled seeds. In Australian commerce a bushel is taken as 20 lb., as are all pasture grass seeds in this country. The main seed-producing countries before the war were the United States of America, Canada, Sweden, Poland and Scotland.

Identification.

Timothy has the appearance of a perennial grass, that forms a matted sod from which numerous leafy shoots arise. Its root system is shallow, being mostly in the first 6 inches of soil.

The shoots each bear four to six short, flat leaves devoid of hairs, and are rolled in the bud in a manner similar to those of toowoomba grass and meadow foxtail. In the vegetative condition there is a close resemblance between these three species. Timothy ligules are white and membranous, have blunt tips, and are longer than broad. The leaf sheath is split and is mostly light-green, but toward the base of the plant its colour merges into a chocolate hue.

The main flowering period of Timothy is in the late spring, when many of the shoots elongate and produce spikelike heads, but there is also a second crop of heads in the autumn.

Whether the plants are growing under favourable conditions or not, most of the shoots which elongate in the late spring form bulbous swellings at their bases, while those that produce flowering heads in the autumn have either no swellings or ones that are poorly developed.

The cylindrical heads are almost completely grown before they emerge from the leaf sheath. Usually they are about 3 to 4 inches long, although sometimes twice this length, and are borne on peduncles 1 to 3 feet high. They resemble somewhat the heads of meadow foxtail but have not the same hairy appearance. The heads are composed of numerous single-flowered spikelets borne on short branches, so that botanically they are classified as contracted panicles rather than true spikes.

Outer glumes of the spikelets are equal and each has a keel which bears a fringe of long hairs, and is prolonged into a short awn less than half the length of the glume. The lemma is shorter than the outer glumes, transparent, with three to five nerves, and the palea is somewhat similar in appearance but shorter and narrower.

A.—The infloresence of Timothy grass. Note its resemblance to the head of meadow foxtail (Alopecurus pratensis, L.).
B.—One of the numerouus spikelets that make up the head.
C.—A spikelet with the outer glumes drawn apart to show the floret consisting of the lemma on the right and the palea on the left. Above is the caryopsis or seed.

The caryopsis of Timothy is held loosely within the palea and lemma, and is shed very readily. It is egg-shaped and pale yellow-brown, with a fine network of thickenings on its surface.

GLOSSARY OF BOTANICAL TERMS.

Anther.—That portion of a stamen which contains the pollen.

Auricles.—Lobes, most common at the junction of leaf and leaf sheath.

Awn.—A slender bristle, often the prolongation of a mid-rib.

Blade.—The expanded portion of the leaf.

Caryopsis.—The grain of a grass in which the seed coat is fused to the wall of the ovary.

Cilia.—Hairs like eyelashes.

Entire.—Without toothing or division.

Flowering glumes or pales.—The glumes which enclose the ovary and stamens. They are known as the lemma and palea respectively.

Floret.—The flower of a grass plant. When complete it consists of two flowering glumes or pales enclosing an ovary and stamens.

Glabrous.—Without hairs.

Glaucous.—Covered with a bluish-green bloom, e.g., as a cabbage leaf.

Glumes.—Paper-like structures which make up the grass spikelet.

Hybrid Plant.—A plant obtained by the fusion of the pollen of one species with the ovule of another.

Inflorescence.—A general term for a group of flowers.

Leaf Sheath.—Portion of the leaf which wraps around the stem.

Lemma.—The flowering glume, which with the palea, encloses the ovary and stamens.

Ligule.—The thin structure on the inside of a leaf at the junction of sheath and blade. It is sometimes reduced to a semi-circle of hairs.

Nodes.—The swollen, knotty portions along the length of the stem.

Outer Glumes.—The glumes which shield the florets.

Ovary.—The female part of the floret. It contains the immature seed or ovule.

Pale.—This term is used for either of the flowering glumes (palea or lemma).

Palea.—The flowering glume which is partly encased by the lemma.

Panicle.—A loose flower cluster.

Pedicel.—A flower stalk.

Peduncle.—The general term for the stalk of an inflorescence.

Protogynous.—A term used to indicate that the stigma matures before the pollen of the same flower.

Rachilla.—A secondary axis in the inflorescence of grasses.

Rachis.—The main axis of a spike or raceme.

Rhizome.—An underground creeping stem; "rootstock."

Seed.—After fertilization the ovule in the ovary develops into a seed (caryopsis). In most grasses this remains permanently encased by the flowering glumes or pales.

Spike.—An unbranched inflorescence in which the spikelets are sessile on the rachis.

Spikelet.—A group or a single floret shielded by one or more bracts or "outer glumes."

Stamen.—The part of the flower that bears the pollen. It consists of a pollen sack (anther) on a stalk (filament).

Sterile glume.—A glume which does not contain an ovary.

Sterile spikelet.—A spikelet which does not contain a fertile floret.

Stigma.—The receptive tip of the ovary. Grass florets usually have two stigmas.

Stolon.—A surface-creeping stem which usually roots at the nodes.

Tiller.—A sucker or branch from the bottom of the stem.

Accredited Brucellosis-free Herds (Swine).

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen	Horn, L. A.	Leongatha North
Bowran, L. G.	"Glendare," Tallangatta	Longerenong College ..	Dooen
Bright, George H. ..	Dumbalk	Pietsch R. E.	Katyil
Castle, L. H.	Clarinda	Rintoul, J. T. C. ..	Glengarry
Critten, H. S.	Dumbalk	Roy, W. A.	Morrell's Hill, via Boolarra
Dookie Agricultural College	Dookie	State Experiment Farm	Rutherglen
Doornbusch, John L. ..	"Starpark", Nhill	Sutherland, R. N. ..	Nullawill
Fairchild and Clutterbuck	Tinamba	Trenery and Soderlund	"Promview", Foster
Geddes, L. D. ..	Bungaree	Trigg, A. J.	Bungaree
Harrison, C. T. ..	"Eastside" Stud, Pomborneit	Trigg, N. H.	Bullarook
		Tweddle, J. T. ..	"Winlaton," Shepparton
Hawtin, I. E. & F. ..	"Rossmoyne", Colac.	Walch, M. U.	Baring
Haywood, Dr. A. R. ..	Hastings		

Hydatid Disease of Animals and Man

By G. NICOL, B.V.Sc., Veterinary Officer.

THAT a somewhat hazy knowledge of the importance of hydatid disease exists is evident from the indifference with which this disease is generally treated. That stock affected with hydatid disease often show no symptoms is true, but this survey would be incomplete if it omitted reference to the serious effects on man wrought by infestation with hydatids.

Fig. 1.—Adult tapeworm (Echinococcus granulosus).
a.—Natural size.
b.—Magnified.
[After Mönnig.

Life Cycle.

The so-called hydatid cyst which occurs in man, cattle, sheep, pigs and other animals is the immature, larval, cystic, or vesicle stage of the tapeworm, *Echinococcus granulosus*, found in the intestines of dogs and occasionally other animals, including wild carnivora. This particular tapeworm of dogs, shown in Fig. 1, varies in length from 2·5 to 6·0 mm. (6·0 mm. = approx. ¼ inch). It will be appreciated, therefore, that the presence of the adult worm or of its segments may be readily overlooked.

Rupture of the ripe segments of the tapeworm liberates the eggs either within the intestines of the dog or after the segments have been passed with the faeces. The eggs are microscopic in size, usually round, but sometimes oval. Ingestion of these eggs by man, cattle, &c., is necessary before further development can take place. Once ingested, the eggs hatch in the intestine, an embryo being formed which is able to burrow through the wall of the intestine and so enter the blood stream, whence it is carried to the liver. In man, most of the embryos are arrested here, but in cattle and sheep the majority pass on to the lungs, while in some cases they pass into the general circulation, and so find their way to other organs such as the spleen, bones, or even nervous tissue. In these sites growth may continue for several years, or the cysts may undergo degeneration and become calcified.

For the life cycle to continue, access by dogs to infested viscera is necessary. Fertile cysts, when eaten by dogs, develop into the adult tapeworm, which is then able to produce further eggs, and so the possibility of infestation of man, &c., continues. According to Mönnig (1938) the number of fertile cysts in cattle averages 10 per cent., in pigs 80 per cent., and in sheep 92 per cent. From these figures it

Fig. 2.—Hydatid cysts in the liver of a sheep.
[After Drabble.

will be seen that practically every cyst in sheep is fertile and so capable of further development on ingestion by the dog.

Pathogenic Importance and Sources of Infestation.

The importance of hydatid disease is chiefly in relation to human health, the effect of the cysts varying from mechanical pressure to interference of function of affected organs, and even death of the individual.

In addition to the fact that they endanger human health, hydatids are the cause of considerable economic loss in the meat industry due to condemnation of affected organs by meat inspectors.

Fig. 3.—Hydatid cysts in the spleen of a pig.

[After Drabble.

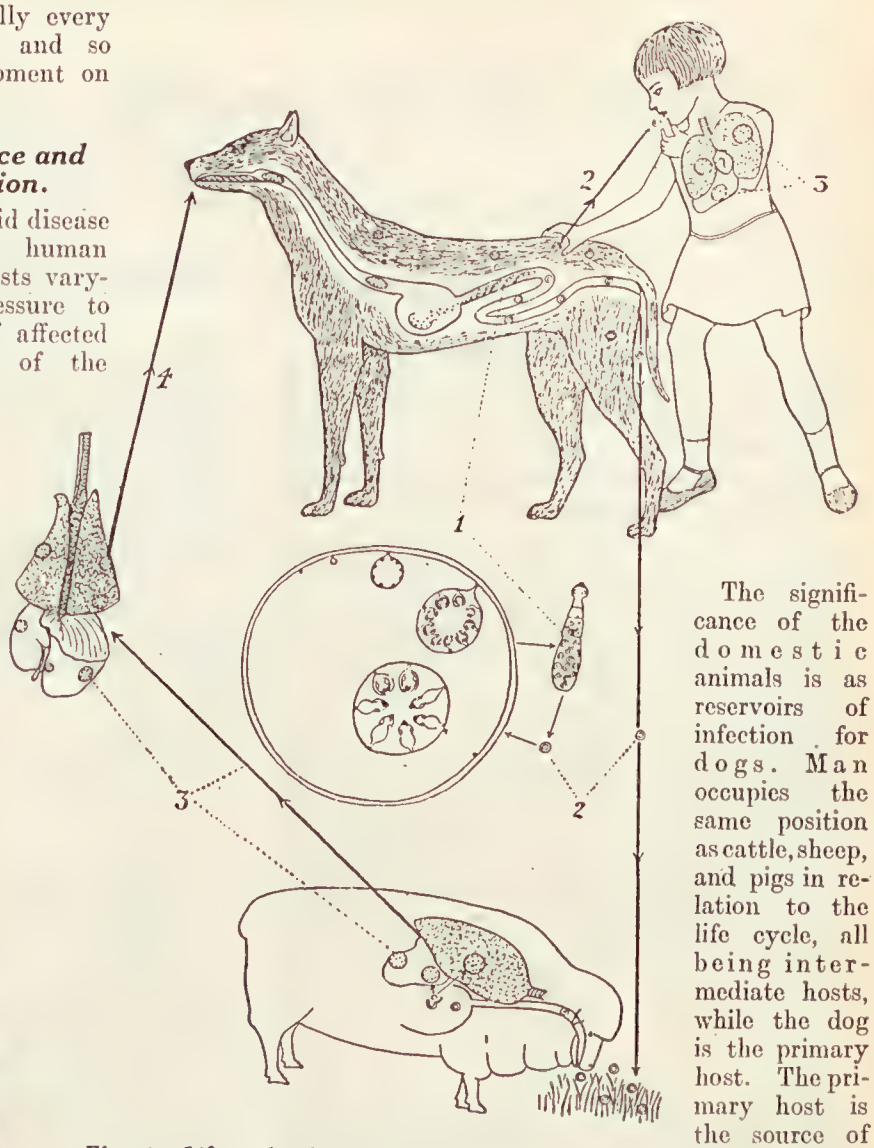


Fig. 4.—Life cycle of Echinococcus granulosus.

[After Mönnig.

The significance of the domestic animals is as reservoirs of infection for dogs. Man occupies the same position as cattle, sheep, and pigs in relation to the life cycle, all being intermediate hosts, while the dog is the primary host. The primary host is the source of infestation for the intermediate hosts, while the infested viscera of the intermediate hosts comprise the source of infestation for the primary host. In other words, the dog, to become infested, must ingest raw offal containing fertile cysts, while man, cattle, &c., become infested from the dog.

Control.

One line of attack suggests itself from a study of the life cycle:—

(*a*) Treatment of the dog for tapeworms; the present recommended treatment is with arecoline hydrobromide: one ½ grain tablet is dissolved in 2 tablespoonfuls (1 oz.) of water. The dose of this solution varies from 1 teaspoonful for pups and small dogs, up to 2 to 4 tablespoonfuls for greyhounds, &c. Treatment should be carried out every eight weeks.

[Continued on page 42

Live Stock Notes

Reminders for January—February

Compiled by A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer.

Bran and Pollard.

BRAN and pollard are the principal concentrated foods purchased for dairy cows, poultry, and, perhaps, pigs, and much unnecessary disorganization often arises when these commodities become scarce or unprocurable.

Because of the reduced export of flour since the outbreak of war, wheat gristing has been reduced and, consequently, the supplies of bran and pollard have been below requirements, despite legislation prohibiting their export without special licence.

High prices of many foods suitable for feeding as substitutes for bran and pollard have prevailed, and this has been a factor contributing to reductions in dairy herds, pig herds, and poultry flocks.

The fall in oat prices to 1s. 9d. per bushel, and the reductions in the prices of wheat to 4s. 0¾d. and of barley to 2s. 7d. per bushel at the beginning of December will relieve to some extent the high pressure demand for bran and pollard.

Nearly all stock feeders have some practical knowledge of the feeding of bran and pollard, but many are reluctant to feed substitutes. This has probably originated from the fact that foods are measured out and not weighed to the stock. As a measure of ground barley, for instance, weighs more than the same measure of pollard, the barley disappears too rapidly, and many stock may become food sick through over-eating when it is measured out to them in the same way as pollard. Therefore, when substitute foods are fed, the size of the measure should be adjusted in accord with the change in weight of the commodity.

Substitutes for Bran.

The principal substitutes for bran are maize, oil-meal, maize gluten (polly) feed, crushed oats, oat branning, barley branning, malt coombs, dried brewers' grains, and lucerne pollard or chaff.

The food value and bulkiness of these fodders vary considerably and, therefore, they cannot all be fed satisfactorily in the same proportions as bran. For instance, 10 lb. of bran contains approximately the same number of nutrients as 5¾ lb. of polly feed or 12½ lb. of lucerne chaff. Therefore, if dairy cows receiving bran are to be changed to polly feed, it will be necessary to feed 5¾ lb. of polly feed only for every 10 lb. of bran previously fed.

The following table shows the weights of various substitutes containing the same number of food units as 100 lb. of bran:—

	lb.
Bran	100
Maize Oil Meal	50
Maize Gluten (Polly) Feed ..	57
Coconut Meal	58
Barley Bran	69
Crushed Oats	71
Oat Bran	94
Dried Brewers' Grains ..	96
Malt Coombs	98
Lucerne Chaff or Pollard ..	126

For dairy cows, bran may be substituted also by various mixtures of ground grain and protein-rich concentrates, such as five parts of ground wheat, oats, barley, or maize, and one part of meat meal (60 per cent. crude protein), or two parts of peanut meal, or three parts of linseed meal. These mixtures are all very much richer than bran and must be fed more carefully, using only 6 lb. of any one of the mixtures to replace 10 lb. of bran. By substituting these mixtures for bran on this basis, milk yields should remain unaltered.

The quantity of bran normally used in the mash for poultry is 30 per cent., but this can be considerably reduced without materially affecting the rations. The bran may be wholly

or partially substituted with maize gluten feed, crushed oats, barley bran, oat bran, dried brewers' grains, or mixtures of these commodities. Lucerne pollard and malt coombs can also be used, but it is customary to feed less than 15 per cent. in the mash. Substitute rations for poultry are dealt with more fully in the poultry section of these notes.

Any limited supplies of bran obtainable should be used with the substitutes to make up the full bran ration for all stock.

Substitutes for Pollard.

The more common substitutes for pollard are ground grain—either wheat, oats, barley, or maize—oat and rice pollards and rice meal. The food values of these commodities resemble pollard more closely than do the food values of the more common substitutes for bran resemble bran, so that fewer precautions are necessary when feeding them.

The following table shows the weights of the various substitutes which contain the same number of nutrients (starch equivalents) as 100 lb. of pollard:—

	lb.
Pollard	100
Ground Wheat	96
Ground Oats	111
Ground Barley	97
Ground Maize	90
Oat Pollard	111
Rice Pollard	96
Rice Meal	93

Pollard, ground grain, and other substitutes are largely fed to pigs and poultry, and for all practical purposes the same quantity of protein supplement should be fed with any one or other or mixtures of these foodstuffs. For poultry, 10 per cent. of meat meal is recommended in the mash. For pigs, ¼ to ½ lb. of meat meal per pig per day, depending upon the amount and nature of the greenstuff available, or its equivalent in skim milk is advised.

On the Dairy Farm.

Probably the three major problems associated with hot summer weather are:—

A. Difficulty in producing and keeping choicest quality cream.

B. Providing an ample and easily accessible supply of clean cool water for stock and domestic purposes; and

C. Supplying the cows with a protein supplement to balance the ration consisting principally of dry pasture.

These three problems are frequently being mentioned in this Journal, and additional advice concerning them will be supplied on application to the Department.

The following are twelve points that must be observed in order continually to produce choicest cream:—

1. Milk only normal healthy cows.

2. Wash and dry the cows' teats and udders before milking.

3. Keep the hands clean so as not to contaminate the teat cups, strippings, &c.

4. *Do not allow teat cups to touch floors, filth, or anything* other than the cows' teats, otherwise filth will be sucked into the milk.

5. Thoroughly wash all machines and utensils, including cans returned from the factory, immediately after use.

6. Sterilize with steam all machines and utensils immediately after washing.

7. Make sure that machines drain dry after sterilizing and remain dry and clean until reused.

8. Clean the cowshed and dairy after each milking and keep them dry between milkings.

9. Prevent dust blowing into dairy and cowshed.

10. Cool the cream. For this purpose a cool water supply is required.

11. Keep the cream in a cool well ventilated cream room.

12. Deliver to the factory as frequently as possible.

Sheep.

Estimates of sheep in the world during 1940 were figured at 740,000,000, growing 4,010,000,000 lb. of wool. The Australian clip was computed at 1,036,000,000 lb.; South America, 606,000,000 lb.; United States, 487,000,000 lb.; New Zealand, 330,000,000 lb.; Union of South Africa, 261,000,000 lb. (*Encyclopædia Britannica, Book of the Year*, 1941).

It is estimated that there were 18,251,870 sheep in Victoria at March, 1940, and 20,412,362 at March, 1941, and that during 1940 155,093,839 lb. of greasy wool, including crutchings was shorn, sheep averaging 8·25 lb. and lambs 2·26 lb. of wool. In addition, approximately 30,000,000 lb. of dead wool and wool stripped from or exported on skins was produced.

Bran and Pollard Substitutes for Poultry.

It has been shown in feeding experiments and in commercial poultry feeding that fowls will lay well on many different foodstuffs. For success, economy must be observed on every poultry farm, therefore it is essential that the ration should consist of a cheap and suitable variety of good quality, properly balanced foods.

A properly balanced ration furnishes all the constituents necessary for good health and high egg production and is free from poisons, disease germs, and substances producing mechanical injury.

The foods fed to poultry consist chiefly of cereals, cereal by-products, green foods, and by-products of plant and animal origin. A very high percentage of protein is contained in meat meal and dried milk, &c., while such foods as cereals are much lower in protein but contain a high percentage of starch.

While there are a number of foods which can be used in place of pollard and bran, the difficulty is that most of them are much more costly. When feeding substitutes this factor is a most important one, especially when returns are low.

In addition to grain in the afternoon and greenstuff, mashes made from the various ingredients as shown below may be fed with satisfactory results.

	Alternate Mash Mixtures.		
	1.	2.	3.
	lb.	lb.	lb.
Pollard	50	25	..
Ground wheat or ground barley	..	20	35
Ground oats or ground maize	10	20	35
Bran	30	15	..
Brewers' grains or Oat branning	..	10	20
Meatmeal	10	10	10

[H. F. Clinton, Poultry Expert.]

Keep the Pigs Growing Fast.

Fast growth in pigs is generally associated with economic production; very slow growth indicates that something is amiss in the breeding, feeding, or health of the pigs, and results in economic loss.

Health is a normal state in pigs, but when disease is present, even to such a slight degree that it is not obvious to the pig raiser, they are not able to grow at their normal rate, and are not able to convert their food to pork efficiently.

Pigs are predisposed to diseases by malnutrition, particularly when they are kept under intensive conditions, and deprived of their natural grazing environment.

Pig raisers can best measure the performance of their pigs by weighing the litters when weaned. A standard of 250 lb. for the whole litter at 8 weeks old should be aimed at. As a check on growth after weaning, a fair standard to aim at is 200 lb. live weight for each pig 200 days after its birth.

Without going into details of foods and feeding practices, pig raisers are advised to feed a variety of foods in ample quantities, and to provide continuous grazing whenever practicable. In the absence of grazing or green food good quality lucerne or clover hay or chaff should be included in small quantities in the pigs' rations.

L. A. Downey, H.D.A., Pig Expert.

Bees.

In districts where Redgum and Yellow Box are in bloom, bee-keepers should have a busy time with the extractor.

Weather conditions have been favourable for an unbroken supply of pollen, consequently most colonies have made rapid increases in numbers, and provided favourable weather continues, a good average yield of honey per hive should result.

During the Redgum flow a strong colony of bees will fill all available space in the hive in about eight days. On such a heavy flow, extracting should commence as soon as the combs show an inch or two of capped cells along the top, otherwise extra labour will be involved, with possible damage to combs in the extractor, caused by the weight and density of honey contained in a comb that has been completely capped. This applies during the hot summer months only, when the dry atmosphere enables the bees to remove surplus moisture from the honey with a minimum of time and effort.

The heavy flows of pollen and nectar from red gum blossom provide ideal conditions for queen rearing, and even if not required at the moment, a few surplus young mated queens are a valuable asset in any apiary.

[J. W. Thomlinson, Apiary Inspector.]

Rearing Orphan Foals.

From time to time many requests are received from owners for information in regard to the correct measures to be taken when a mare dies at or after foaling, leaving a young foal to be reared artificially.

If proper care is taken, foals can be satisfactorily reared on cow's milk. Whenever possible the milk should be taken from a newly-calved cow, and for preference it should have a low fat content.

Take four tablespoonfuls of lime water, and one tablespoonful of sugar dissolved in a small quantity of warm water, and add fresh milk to make one pint.

If the foal is newly born, one-quarter (5 ounces) of the above mixture, warmed to blood heat, should be fed every hour for the first few days.

An ordinary nursing bottle with a large nipple is a satisfactory means of feeding until the foal has learned to drink from a bucket, which it soon does after being allowed to suck the attendant's fingers. All utensils used must be carefully washed and sterilized by boiling before each feeding.

As the foal grows the amount of milk given is gradually increased, the time between feedings is lengthened, and whole milk is finally substituted. After the first few days six feedings a day will be sufficient, and a little later only four feedings will be necessary. The sugar may be eliminated when the foal is about one month old, but it is advisable to continue with the lime water. At six weeks skim milk may be gradually substituted, and at three months the foal can be given as much as it cares to drink three times a day. A little cod liver oil, or one of the substitute oils now used to replace cod liver oil, is a useful addition to the daily ration.

Should diarrhoea occur, a dose of 2 to 4 tablespoonfuls of a mixture of castor oil and olive oil in equal parts may be given well shaken up in milk, and the feeding of milk should be withheld for a few feedings, sweetened warm water with lime water being substituted.

The foal should be given solid food, such as oatmeal, bran, crushed oats, chaff, lucerne or hay, as early as possible, and allowed to run in a good paddock to get plenty of exercise and fresh air.

Young foals should be taught at an early age to lead with a halter, to stand tied up, and to allow the handling of their legs.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

VETERINARY NOTES.

Tapeworms in Poultry.

The presence of tapeworms in fowls may be responsible for leg weakness and paralysis.

There is no known effective treatment for the eradication of tapeworms. The control of these worms depends mainly on the hygienic conditions under which the birds are kept. The eggs of the tapeworms are passed out with the droppings, then go through an intermediate stage of development in slugs and earthworms. The birds become reinfested by eating the contaminated slugs and earthworms. Prevention is most readily effected by confining the birds in pens with concrete floors, and supplying green food which has not been contaminated with poultry droppings. Strict attention to disposal of droppings, and the maintenance of clean conditions in the pens will assist in minimizing the trouble.

It is helpful to give about 1 to 2 per cent. of cod liver oil, or a good quality fish oil with a guaranteed vitamin content, in the mash every morning.

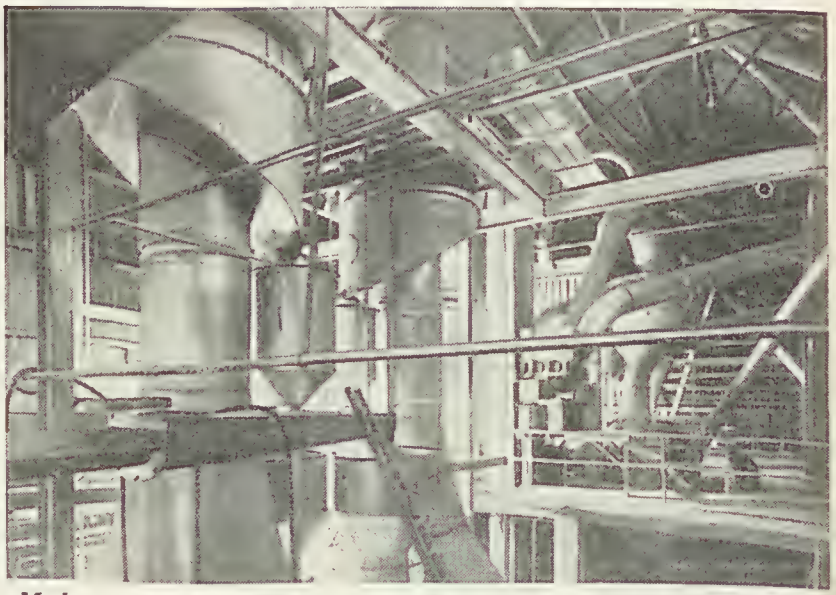
[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

The Agricultural Lime Act

Brands Registered for 1942

By W. C. ROBERTSON, Chemist.

AGRICULTURAL lime includes calcium oxide, calcium hydrate or calcium carbonate, or a mixture of one or more of these ingredients. For the purposes of the Agricultural Lime Act, calcium oxide is burnt lime; calcium hydrate is slaked lime, and calcium carbonate is ground limestone or chalk. Such terms as carbonate of lime and hydrate of lime are not strictly accurate.



Modern plant used for manufacture of high-grade water-slaked lime.

The provisions of the Act apply only to sales *exceeding half a ton*, and its main objective is the control of the quality of agricultural lime which is sold to the man on the land as a soil improver. Upon the sale of agricultural lime *in quantities exceeding* 10 *cwt.* the vendor must at the time of sale or before delivery give to to the purchaser a signed invoice certificate (which is a warranty) stating—(1) the name and place of business of the vendor; (2) the brand name which designates the form in which the lime occurs; (3) the quantity comprised in the sale; and (4) the proportion per centum of calcium oxide and the form or forms in which it occurs together with its calcium carbonate equivalent, the percentage of magnesium oxide and the percentage of the agricultural lime passing through a twenty-mesh sieve. Every manufacturer or dealer must see that a clearly printed label is affixed to each bag or parcel, certifying similar particulars as required in the case of the invoice certificate. These provisions are of the utmost importance to the purchaser, mainly because of the fact that the *form and quality* of the article are guaranteed.

Agricultural lime is sold in three forms, each having a distinct brand name to designate whether it is ground burnt lime (mainly oxide), slaked lime (mainly hydrate), and ground limestone in which the lime occurs wholly as carbonate. Ground burnt lime is the product obtained when limestone is burnt in a suitable kiln and subsequently ground to powder. Slaked lime is burnt lime which has been slaked either by exposure to air or treated with steam or water. Ground limestone is limestone which has been ground to powder. Chalk is similar to ground limestone, but occurs naturally in the amorphous condition or is formed as a by-product in industry by the carbonation of lime. As the carbonate is the natural stable form of lime, it is obvious that the unstable forms, i.e., the oxide and hydrate will finally revert to the carbonate on the farm when used as soil ameliorators. The reversion to hydrate will be almost immediate, the subsequent reversion to carbonate being much slower.

The Form of Lime to Buy.

The sixteen brands of agricultural lime registered for the current season include ground burnt lime (4), slaked lime (7), and ground limestone (5).

The average quality and price per ton compare as follow:—

—	Lime (CaO).	Price per Ton in 11 Ton Lots f.o.r.	Average Value in Pence of Each. One per cent. Lime per Ton.
	%	£ s. d.	
Agricultural ground burnt Lime	82·9	3 0 0	8·69
Agricultural slaked lime	59·4	2 2 4	8·54
Agricultural ground limestone	48·3	1 6 0	6·46

One ton of average ground limestone costing 26s., computed on the lime content, is equal to 16¼ *cwt. of average slaked lime costing* 34*s.* 3*d. or* 11¾ *cwt. of average ground burnt lime costing* 35*s.* 3*d.* The figures, which are approximate, definitely favour ground limestone. Agricultural lime is quoted in 11-ton trucks free on rail at the railway station nearest the lime works. The freight, which is equal to that paid on fertilizer, varies with the distance transported.

Assuming 11-ton trucks of ground burnt lime, slaked lime, and ground limestone to be purchased, and that the consigning stations are 100 miles and 300 miles respectively from the receiving station, the average cost per ton of lime (CaO) in trucks at the latter station would be:—

Distance Freighted.	Ground Burnt Lime.	Slaked Lime.	Ground Limestone.
	s. d.	*s. d.*	*s. d.*
100 miles ..	79 1	80 9	65 1
300 miles ..	85 7	89 10	76 3

In the case of ground burnt lime the 11-ton truck would contain approximately 9¼ *tons of* lime (CaO), whereas the lime in the case of the slaked truck would be 6½ *tons* and in the truck of ground limestone 5⅓ *tons*. The figures again favour the purchase of agricultural lime in the form of calcium carbonate (ground limestone), and show that *slaked lime is the dearest form to buy.* However, it should be noted that the cost of extra transport and handling to and on the farm must be considered. Assuming that it costs 3*s.* more per ton per acre to spread the carbonate than the oxide and allowing another 1*s.* for additional transport cost, the figures still favour the carbonate, particularly for farmers within 100 miles of the lime works, but where transport exceeds 300 miles, then the oxide (burnt lime) would be the best to buy.

These remarks are based on the lime content, transport and handling charges only. Many hold that some value should be given to the oxide and hydrate forms when applied to the soil, owing to the physical improvement and chemical reactions generated during the transition stage from oxide to the carbonate. This is probably correct, but will depend upon the amount of lime applied, i.e., the effects in the case of light dressings are slight, but become more pronounced in heavy applications. Another advantage of the caustic forms is their insecticidal value. Apart from cheapness, the carbonate form has additional advantages in the ease and convenience of spreading and safety of storage and handling.

It will be gathered from the foregoing that the problem of the best form of agricultural lime to buy is not an easy one, and no general recommendation can be made. Each case should be considered on its merits, but probably the best answer is "burnt lime for arable land, intense culture and long-distance haulage, and ground limestone for pasture (excepting in special cases) particularly in areas within 300 miles of the lime works."

Lime as a Fertilizer.

Lime may be regarded as a soil improver, but in no case is it a fertilizer, and should not be used with the object of saving the superphosphate bill. Excellent results often follow "liming" in the autumn and superphosphate in the spring. Superphosphate should always follow lime, and the practice of applying superphosphate in the autumn and lime in the spring is not recommended.

Lime Sales Increasing.

The use of lime on the farm soils of Victoria is definitely increasing. Part of this increase is due no doubt to existing circumstances. Lime in the burnt form has always been used

Lime kiln and slaking plant at a leading lime works.

extensively and periodically by the market gardener and floriculturist, and in many cases by the orchardist and those practising other branches of intense culture. However, the increase in recent years has been mainly applied to pasture land following acidity tests. Many graziers on large holdings are apparently becoming interested in liming, and it can be assumed that not all the interest is due to the activities of the salesman.

LIST OF AGRICULTURAL LIMES REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE AGRICULTURAL LIME ACT 1934 (No. 4271) FOR THE YEAR 1942.

General Description.	Brand.	Calcium Oxide.	In the Form of—	Equivalent to Calcium Carbonate.	Magnesium Oxide.	In the Form of—	Degree of Fineness. Material Passing Through a 20-mesh Sieve.	Price per Ton in 11-ton Lots.	Manufacturer.
Agricultural Lime—		%		%	%		%	£ s. d.	
Ground Burnt (unslaked)	Lilydale, No. 1	87·70	Mainly oxide	156·90	5·00	Mainly oxide	65·00	3 5 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
„ „ „	„ No. 2	80·00	„	143·00	5·00	„	60·00	2 15 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
„ „ „	Kurdeez ..	80·00	„	142·85	1·52	„	55·00	3 0 0	Victorian Agricultural Lime Ltd., 422 Collins-street, Melbourne, C.1
„ „ „	Kawa ..	83·80	„	149·70	1·20	„	84·00	3 0 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
Agricultural Slaked Lime	Lilydale ..	60·00	Hydroxide and carbonate	107·23	3·00	Mainly hydrate	80·00	2 0 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
„ „ „	Cave Hill ..	50·00	„	89·50	5·00	„	72·00	1 10 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
„ „ „	White Rock ..	60·00	„	107·00	2·00	„	70·00	2 0 0	White Rock Lime Co. Pty. Ltd., 19 Queen-street, Melbourne
„ „ „	Snowflake ..	60·00	„	107·10	1·80	„	75·00	2 5 0	Evans Bros. Pty. Ltd., Yarra Bank-road, South Melbourne
„ „ „	Bulldog ..	51·80	„	92·40	·80	„	60·00	2 5 0	Bulldog Lime Co. Pty. Ltd., 344 Swan-street, Richmond, E.1
„ „ „	Kawa ..	66·70	„	119·10	1·20	„	90·00	2 10 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne
„ „ „	Wimmera ..	67·6	„	120·6	1·4	„	99·00	2 6 6	I. H. McClure, Mitre
Ground Limestone or Chalk	Lilydale ..	50·00	Carbonate	89·50	3·00	Carbonate	95·00	1 5 0	David Mitchell Estate, Oliver's-lane, Melbourne, C.1
„ „ „	Walker's ..	44·80	„	80·00	2·00	„	75·00	1 5 0	David Walker, Waverley Lime Works, Lara
„ „ „	Lara ..	45·00	„	80·00	1·50	„	80·00	1 10 0	Lara Fertiliser and Lime Co., Lara
„ „ „	Kurdeez No. 1	50·40	„	90·00	1·50	„	80·00	1 5 0	Victorian Agricultural Lime Ltd., 422 Collins-street, Melbourne
„ „ „	Kawa ..	51·40	„	91·70	1·20	„	75·00	1 5 0	P. Alkemade and Sons, 535 Little Lonsdale-street, Melbourne

Melbourne, 9th December, 1941.

W. R. JEWELL, M.Sc.,
Chemist for Agriculture.

Weed Seeds in Flax

By MARGOT E. H. COWEN, B.Agr.Sc., Seeds Analyst

WITH the great expansion of the flax industry and extension of the area under production in Victoria, consideration must be given to the weeds that might possibly appear in flax crops.

All seed which is supplied to the farmers by the Flax Production Committee is tested for purity and germination. The standards required for flax seed are a maximum allowance of 1 per cent. of weed seeds, with a total of 3 per cent. weed seeds and inert matter, and a minimum germination of 65 per cent. Seeds of certain weeds are totally prohibited, and with others not more than a definite number per ounce of seed is allowed. All the seed supplied to the farmers for sowing must conform with these requirements. The average purity of Victorian-grown flax seed for 1940-41 season was:—pure seed, 99.3 per cent.; weed seeds trace, inert matter 0.7 per cent.; and the average germination 89·7 per cent.

The commoner weed seeds found, with one or two exceptions, belong to three natural orders or families.

(1) The Gramineae or grass family, including:—

Rye Grass (*Lolium perenne*),
Drake (*Lolium temulentum*),
Spear Grass (*Bromus sterilis*),
Wild Oats (*Avena fatua*),
Hair or Silver Grass (*Festuca bromoides*),
Canary Grass (*Phalaris minor*).

(2) The *Cruciferae* or Rape and Turnip family, including:—

Rape (*Brassica Napus*),
Common Cress (*Lepidium sativum*),
Field Pepper Cress (*Lepidium campestre*),
False Flax (*Camelina sativa*),
Flat-seeded False Flax (*Camelina dentata*).

(3) The *Polygonaceae* or Dock family, including:—

Docks (*Rumex spp*),
Sorrel (*Rumex acetosella*),
Black Bindweed (*Polygonum convolvulus*),
Hogweed (*Polygonum aviculare*),
Lady's Thumb (*Polygonum persicaria*).

Other common weeds found in flax seed are:—

Fumitory (*Fumaria officinalis*),
(*Chenopodium spp.*),
Spurry (*Spergula arvensis*).

Noxious Weeds

Particular care is taken to have seed free from noxious or troublesome weeds which might occur, and have been found in flax crops in other countries. If seeds of these weeds cannot be readily and completely removed during cleaning operations, the flax seed is not used for sowing. Of these troublesome weeds there are three which belong to the *Cruciferae*:—

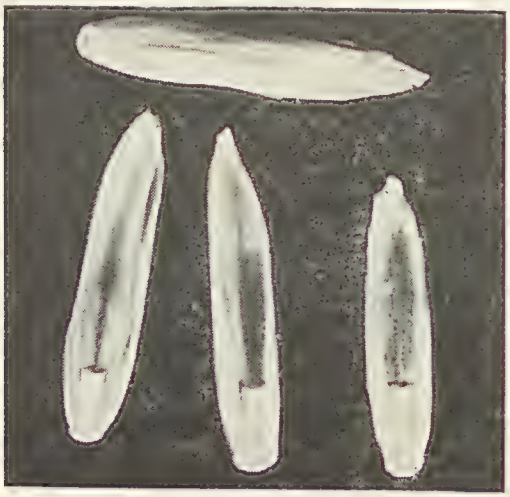
Wild Radish or Jointed Charlock (*Raphanus raphanistrum*),
Charlock (*Brassica Sinapistrum*),
Hoary Cress (*Lepidium draba*).

It is possible to remove all traces of Wild Radish and Charlock during the cleaning operations, but seed which is known to have Hoary Cress is not used for sowing purposes.

Another weed which is troublesome in some areas is Onion Twitch (*Arrhenatherum avenaceum* var. *bulbosa*), belonging to the *Gramineae*.

In the following descriptions these four weeds are included in their respective families for the purposes of comparison.

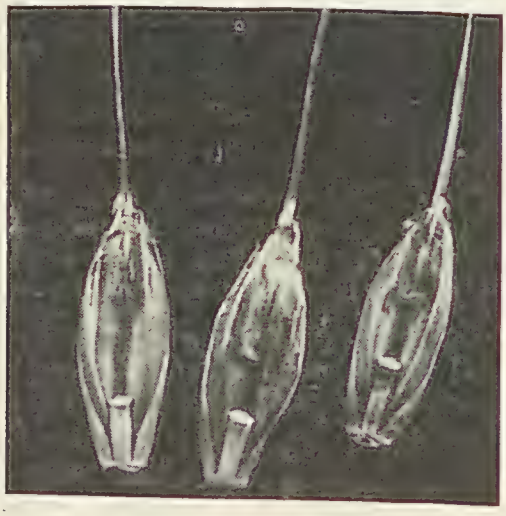
Perennial Rye Grass (*Lolium perenne*).—Seed is approximately ¼ inch in length, and is oval or canoe-shaped. The palea and lemma are straw-coloured, the lemma being smooth,



Perennial rye grass.

round or slightly pointed at the apex, and curved round the sides of palea. The rachilla is flattened and wedge-shaped, and pressed against the convave surface of the palea. The caryopsis is spindle-shaped, with a shallow groove on the under surface, and varies in colour from cream to dark purple.

Drake or Darnel (*Lolium temulentum*).—Two types or varieties of Drake or Darnel may be found in flax. One has a large seed,

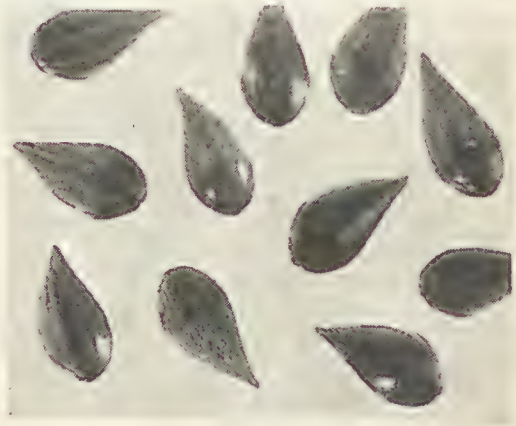


Drake or darnel.

approximately ¼ inch in length. The seed is large, swollen in appearance, and drab in colour. The lemma is harsh, with a long terminal awn, the palea minutely bristly on the edges, with a broad groove in which the cylindrical to wedge-shaped rachilla lies. The caryopsis is brownish.

The other is a small seeded type, about 1-6th inch in length. The seed is plump but smaller, lighter in colour, not so harsh, and when found in flax samples is always awnless.

Canary Grass (*Phalaris minor*).—Seed varies from 1-7th to 1-10th of an inch in length. It is dark, brownish-grey, rounded at



Canary grass.

base, and tapering rapidly to a point at the apex, The caryopsis is closely invested by stiff and shiny lemma, with two well-marked veins on each side, keeled at back, slightly pubescent near the apex. There is a narrow scale or sterile glume at the base, extending from 1-4 to 1-3rd of the way up the palea side of seed.

Hair Grass or Silver Grass (*Festuca bromides*).—The seed of this grass is about ¼ inch in length, or with the awn it is ⅝ to ¾ inch long. It is very slender and dark, but the awn is lighter in colour. The lemma gradually tapers into a fine awn. Both lemma and awn are rough, being covered with minute teeth. The rachilla is cylindrical, with a disc-like tip.

Hair or silver grass.

Sterile Brome Grass or Spear Grass (*Bromus sterilis*).—Seed is approximately ¾ inch in length, or if the awn is included, it is up to 1½ inch long. It is narrow and elongated, the lemma being scabrid or rough, with minute bristle-like teeth, bifid at tip, nerved, with dorsal nerve prolonged into fine, rough sub-terminal awn, frequently as long or longer than lemma, but usually broken off when found in seed samples. The rachilla is cylindrical, long, and rough.

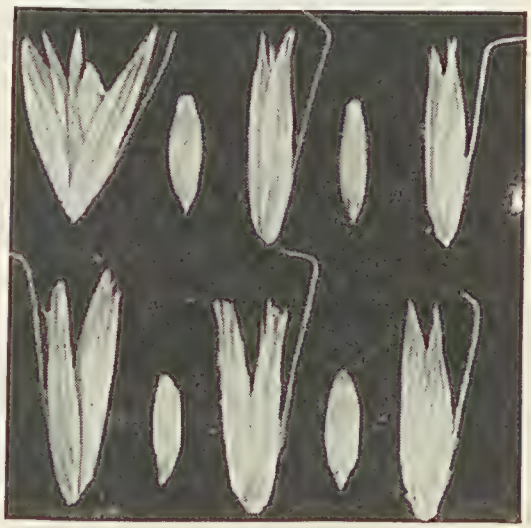
Sterile brome grass.

Wild Oat (*Avena fatua*).—Seed is about 3-5th inch in length. It is broad, cylindrical, and tapers at apex. The colour varies from dark brown to pale yellow and almost white. Lemma with thick tuft of brown to yellow bristle-like hairs at base and otherwise more or less sparsely hairy. The rachilla is long and cylindrical, with well-marked sucker-like tip, covered with bristle-like hairs, and frequently with a thick tuft at the tip. The base of the

Wild oat.

seed shows a characteristic articulation differing from the fracture found in cultivate oats. The caryopsis is yellow in colour, and covered with soft hairs thicker at the apex.

Onion Twitch (*Arrhenatherum avenaceum var. bulbosum*).—The seed of Onion Twitch is about 5-16th of an inch in length. It is light-straw coloured, usually having two florets



Onion twitch.

together with papery outer glumes of unequal size. The lemma of lower floret is occasionally sparsely hairy near base, with a dorsal twisted kneed awn arising near the base. The lemma of the upper floret is usually awnless. Both lemmas are strongly nerved.

In Onion Twitch the lower floret is fertile, so distinguishing it from the true Tall Oat Grass where the lower floret is sterile.

The naked caryopsis is sometimes found in seed samples; it is pale yellow, soft, pubescent at tip, almost cylindrical and tapering to a point at the base.

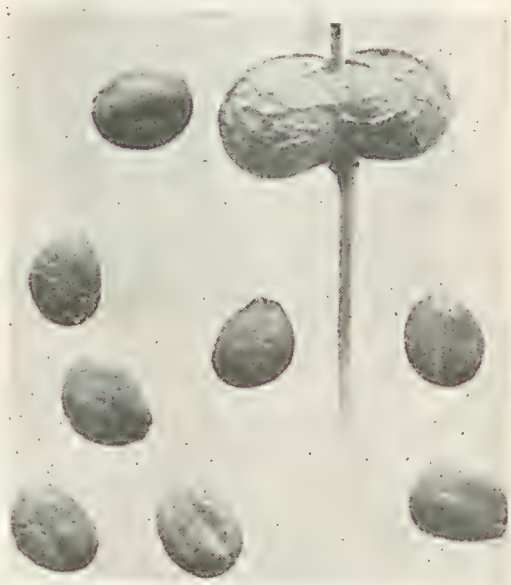
Field Pepper Cress (*Lepidium campestre*).—The seed of this weed is about 1-10th inch in length. It is purplish to reddish brown in colour, but lighter when immature. The surface is dull and finely granular. It is oval to egg-shaped, tapering at point of attachment. There is an indistinct furrow at each side of radicle, a well-marked white scar running from point of attachment to two-thirds of way along seed.

Pod—ovate, winged to base, with a short style in a shallow notch.

Field pepper cress.

Hoary Cress or White Weed *(*Lepidium draba*).—Seed varies from 1/16th to 1/12th of an inch in length. In colour it is purplish brown, or lighter and redder when immature. The surface is dull and finely granular. It is broadly ovate, some seeds tapering slightly at point of attachment. There is a white scar running from point of attachment to one-third of the way along seed, with fairly well-marked double furrow outlining the embryo.

* Proclaimed as a Noxious Weed under the *Vermin and Noxious Weeds Act*, 1928.



Hoary cress.

Pod-cordate, surface has reticulate spongy appearance, with a well-marked prominent style in notch.

Seeds of *Lepidium campestre* and *Lepidium draba* may be confused. The differences are:—

(1) Length of seed—*L. campestre* longer than *L. draba*.

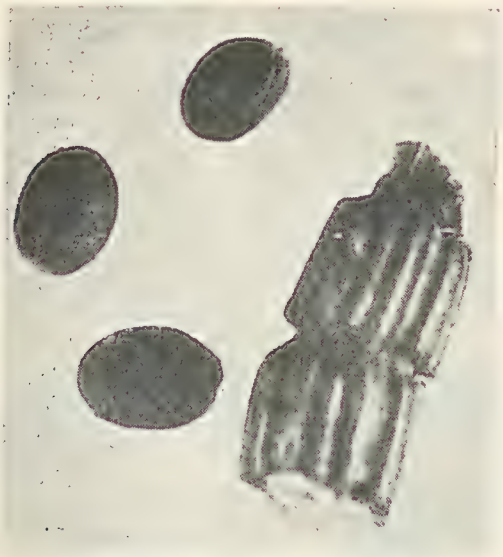
(2) Shape of seed—*L. campestre* more pointed than *L. draba*.

(3) Furrow outlining embryo—*L. campestre* has a single furrow on each side of radicle; *L. draba* has a double furrow.

(4) Length of white scar—*L. campestre*, the scar is $\frac{2}{3}$rds length of seed, and in *L. draba* the scar is shorter, approximately $\frac{1}{3}$rd the length of the seed.

(5) The shape and appearance of the seed pods—the pod of *L. campestre* is ovate, smooth, winged with a short style, and of *L. draba* is cordate, spongy, and reticulate with a prominent style.

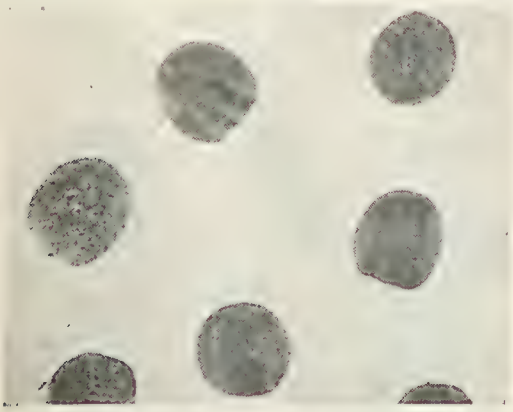
(6) Microscopic differences in the seed coats.



Wild radish or jointed charlock.

Wild Radish or Jointed Charlock* (*Raphanus Raphanistrum*).—The pod varies in length from $\frac{1}{8}$ to 7-16th inch in length, and the seed from 1-10th to 1-8th inch. The seed is usually found enclosed in the pod, the latter being constricted between each seed and breaking into one-seeded segments.

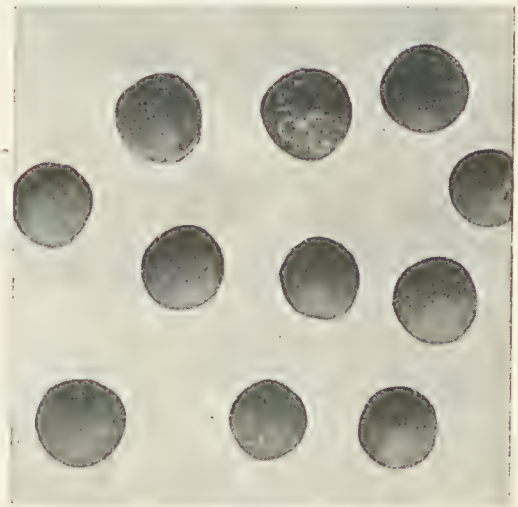
The pod is pale yellow to light greenish-grey, the segments showing more or less well-marked, longitudinal rides. The pod is thick and tough and the inner surface against the seed is smooth and yellow. The seed is yellow to light reddish-brown in colour, is dull and finely granular, and spherical to almost cylindrical in shape, showing faint but characteristic furrows and a scar at the point of attachment.



Rape.

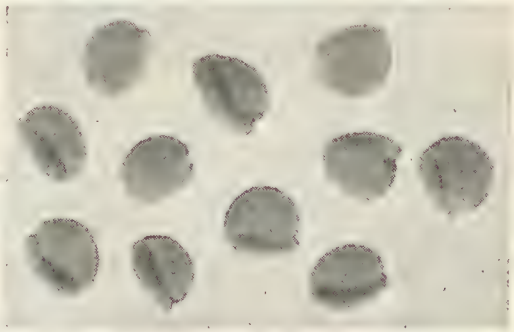
Rape. (*Brassica Napus*).—Seed varies from 1-15th to 1-13th of an inch in diameter. It is purplish brown to black in colour, and reddish when immature. The surface of seed coat is dull and finely granular when magnified. The seed is spherical, usually with two well-marked furrows down one side, with a slight scar at the point of attachment.

Charlock* (*Brassica Sinapistrum*).—Seed is similar in appearance to Rape, except that the furrows are fainter or sometimes absent. The seeds can be distinguished definitely only by a microscopic examination of the seed coat.



Charlock.

Flat-seeded False Flax (*Camelina dentata*).—The seed is about 1-12th of an inch in length. It is pale yellow in colour, with a dull surface. It is flattened and almost disc-like, with radicle lying on one edge of the disc, outlined with a furrow on each side.



Flat-seeded false flax.

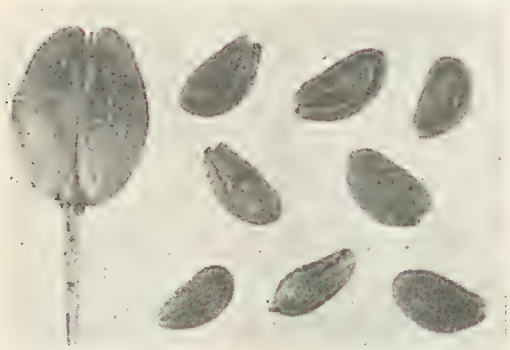
* Proclaimed as Noxious Weeds under the *Vermin and Noxious Weeds Act* 1928.

False Flax or Gold of Pleasure (*Camelina sativa*).—Seed is about 1-12th of an inch in length. It is yellow to light brown in colour. The surface is dull, finely granular, oblong ovate, with a well-marked straight ridge between two longitudinal furrows.

False flax or gold of pleasure.

The pod is more or less pear-shaped, with several seeds in each cell. The edges are flattened, with a narrow margin and prominent style.

Common Cress (*Lepidium sativum*).—The seed of common cress is approximately $\frac{1}{8}$th of an inch in length. It is yellow to golden brown in colour. The surface of the seed coat is dull and finely granular when magnified. The shape is oblong, elliptical, with



Common cress.

furrows defining the position of the radicle and cotyledons. There is a faint white scar at the point of attachment.

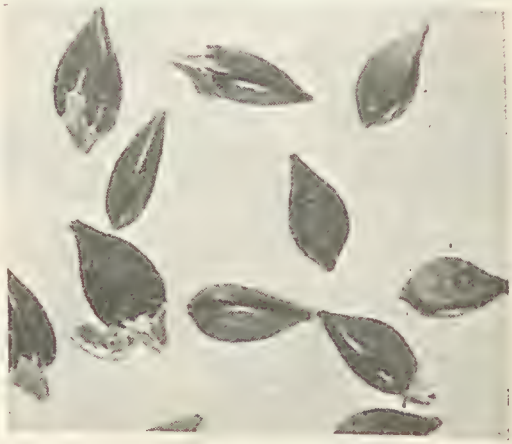
The seed pod, which may be found in flax seed, is broadly ovate to circular in shape, with a small notch at the tip. The stigma is not so apparent.

The seeds of *Camelina sativa* may be confused with those of *Lepidium sativum*. The differences are:—

(1) Length of seed.—*Camelina sativa* seeds are slightly shorter than those of *L. sativum*.

(2) Furrows outlining the embryo.—In *Camelina sativa* there are two well-marked furrows lying on each side of the radicle; in *L. sativum* there are several more or less indistinct furrows on each side of the seed, outlining the radicle and the folds of the lobed cotyledons.

Hogweed (*Polygonum aviculare*).—Seed is about 3-32nds of an inch in length. It is reddish-brown to black in colour. The surface is dull. It is triangular in section, as with



Hogweed.

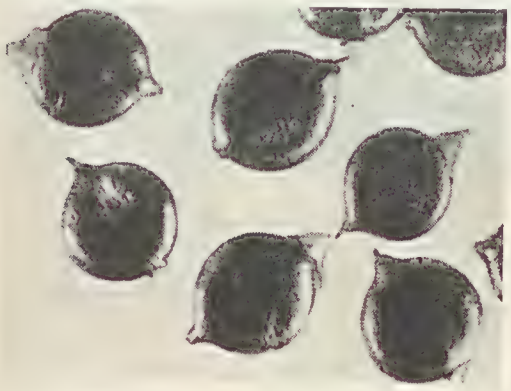
other members of the order, but blunter at one end, often with the remains of the stalk and seed coat adhering to it. It tapers to a point at the other end.

Black Bindweed or Field Buck Wheat (*Polygonum convolvulus*).—Seed is about $\frac{1}{8}$th of an

Black bindweed.

inch in length. It is black in colour. The surface is dull, sometimes with a dull-greyish, papery seed coat adhering to the seed. It is spindle-shaped, triangular in section. The faces of the seed are not as concave as those of the Docks.

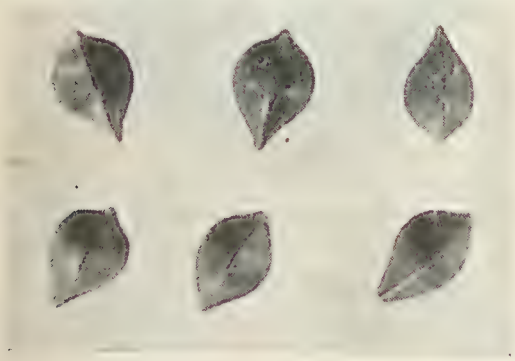
Lady's Thumb (*Polygonum persicaria*).—Seed is about 1-12th of an inch in length. It is black and shining. Flattened, rounded at the base, sometimes with remains of stalk and



Lady's thumb.

seed coat adhering, curving to a small point at the other end. The third side usually appears as a flattened ridge. Occasionally, three-sided seeds are found.

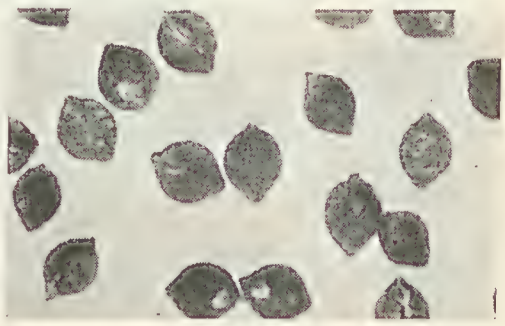
Docks (*Rumex spp.*).—The seeds of several different varieties of dock are found in flax seed samples. As they are similar in appearance and difficult to distinguish between the species they are described together. The seed varies from 1-16th to 1-12th of an inch in



Dock.

length. It is chestnut-brown in colour. The surface is smooth and shining. It is spindle-shaped, and triangular in cross-section.

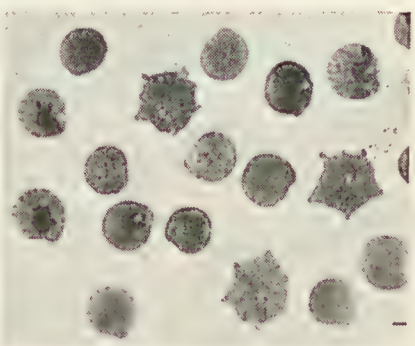
Sorrel (*Rumex acetosella*).—Seed is about 1-24th of an inch in length. It is similar to



Sorrel.

other species of *Rumex,* but much smaller. In flax seed it is frequently found with shrivelled seed coat adhering to the seed.

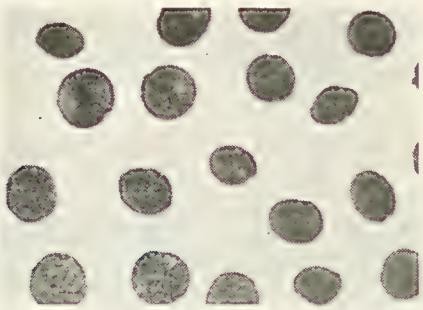
Chenopodium spp.—Usually Chenopodium album, but it is impossible to distinguish between seeds of *Chenopodium album, C. rubrum,* and *C. murale.* The hulled seed is approximately 1-32nd of an inch across.



Chenopodium spp.

It is black to grey in colour. The surface is variable, shiny to dull, with radiating marks. In shape it is circular, flattened, with beak at one side. It is often found in remains of calyx, which is greenish-grey in appearance.

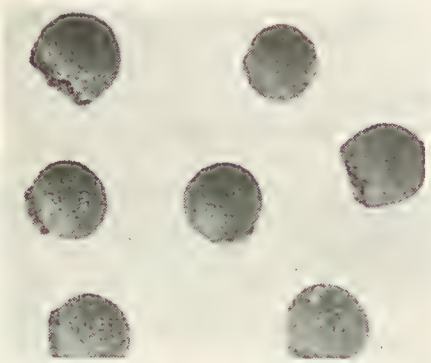
Spurry (*Spergula arvensis*).—The seed is approximately 1-32nd of an inch across. and is dull-black in colour. It is biconvex



Spurry.

and disc-like, with a light-coloured, equatorial ridge or wing. Often it has light-brownish, warty flakes on the surface.

Fumitory (*Fumaria officinalis*).—Seed is about 1-12th of an inch in length. It is olive-green to black in colour. The surface is dull and roughened. In shape it is almost spherical, with equatorial ridge showing a small indentation at opposite end. It is expanded, flattened, and almost sucker-like at point of attachment.



Fumitory.

HYDATID DISEASE OF ANIMALS AND MAN—*continued from page 27.*

(*b*) Discontinuance of the practice of feeding raw offal to dogs will eliminate the source of infestation. Where offal is fed to dogs it should be boiled for at least ten minutes, to render the cysts sterile. The feeding of organs which are apparently normal is not advised (unless boiled), as frequently the cysts are small and apt to be overlooked.

Other methods of control are but supplementary to the foregoing. They consist of:—

(*a*) Personal hygiene—that is, to wash always after fondling dogs and handling sheep (the fleece may be contaminated with dog faeces containing tapeworm eggs).

(*b*) Instruction of children in hygiene.

(*c*) Daily collection of dog faeces, so that any eggs contained therein are not distributed.

Summary.

Hydatid disease, a prevalent disease in domestic animals, is often attended by fatal results in man.

Domestic animals (cattle, sheep, and pigs) act as reservoirs of infection for dogs.

Fig. 5.—Hydatid cysts in heart of ox.
[After Drabble.

Control measures should aim at the prevention of dogs gaining access to raw offal, the treatment of offal to render the cysts sterile, and the treatment of dogs with arecoline hydrobromide.

Records of Pig Production

Tests at Longerenong Agricultural College

By G. C. GRIFFITHS, Dairy and Piggery Instructor at the College

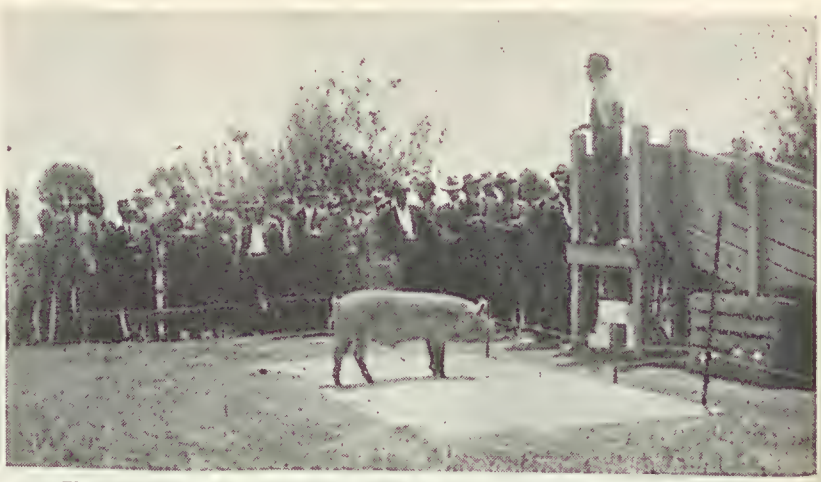
The Pig Raising Competitions, which were reported in the November issue of this Journal, required the recording of certain information relating to the production and quality of the pigs entered. The Longerenong Agricultural College, in an endeavour to secure for its own use more information than the conditions of the competition required, kept records of the feeding of four litters of pigs entered in the competition. The following report on the records has been prepared by Mr. Griffiths.

FOUR litters were selected for testing, two pure-bred Large Whites and two Large White x Middle White crossbred litters. The former were nominated in the baconer class while the latter comprised the two entries in the porker division; these subsequently gained first and second prizes in this section. In order that the information from testing might be of general value the methods of treatment and feeding were kept as closely as possible to those employed at the college in rearing ordinary market stock.

As wheat was the principal food a record of the quantities used, together with the cost of feeding, provided useful information and showed that, when this grain is balanced with separated milk and/or meat-meal, a satisfactory carcass can be produced at a reasonable profit. Supplementary feeding of each litter commenced on the 28th day from birth, and records of food consumed were kept from this time until the date of despatch from the college. A small self-feeder, in which a mixture of bran, wheat, and meat-meal formed a balanced ration, was available for use by the young pigs from this date. In addition to the feeder, small quantities of separated milk and greenstuff were provided daily in a trough. Both self-feeder and trough were enclosed in a "creep" to allow uninterrupted feeding facilities, the sow receiving her daily food supply in a separate trough. The litters, of

course, had their mothers' milk in addition to the supplementary feeding recorded in these tests from one month old.

Records of the food consumed by each sow during pregnancy and while suckling the litter were omitted from the trial owing to the difficulty of keeping an accurate account during this period. It is customary to run a number of brood sows together and, in addition to grain and meat-meal, they receive a proportion of "slop" from the college kitchen.



The piggery instructor addressing a party of farmers at the college piggery.

All pigs were weighed on the 28th day from birth, and with the exception of entry No. 3 on each 28th day thereafter, weaning in each case was carried out on the 56th day after birth.

A litter of eleven pigs sired by Promview King 105th and from Longerenong Superior 10th was born on the 26th February, 1941. When 28 days old this litter weighed 137 lb., and after 56 days it weighed 417 lb. This litter was entry number 3 in the Pig Raising Competition.

Entry number 4 in the competition was another litter of eleven pigs by Promview King 105th, and from Longerenong Primrose 37th. This litter weighed 144 lb. when 28 days old and 417 lb. when 56 days old.

From the time these two litters were weighed until they were eighteen and sixteen weeks old respectively they were kept in large yards without pasture and fed with self-feeder, each litter being kept separate. For the next four weeks, owing to lack of space, it was necessary to run both litters together with a small number of other pigs of similar size. A total of 26 pigs were now running in the same paddock and receiving their food supply from one self-feeder. The food consumption of the pigs was averaged for this period. The rate of progress to the quantity of food consumed showed a substantial drop during this period, possibly as a result of too many pigs running together. At the end of this period five pigs from each litter, neither the heaviest nor the lightest, were selected, placed in the finishing pens, and hand-fed twice daily for the remainder of the time. During the last fortnight a restricted ration was allowed with the object of retarding the tendency to become over fat. In each case, on appraisal of the pig selected for slaughter, a higher proportion of fat to carcass weight than desirable was discovered. This suggests that the period of restricted feeding could, with advantage, have been lengthened to obtain a leaner pig.

It would appear reasonable to assume that the type of pig was not equal to the task of finishing at bacon weight and producing the ideal carcass under full feeding conditions. If restriction of food supply is needed to slow down the final stages of development, the fault must be corrected by selection of a type that continues bone and muscle growth for a longer period.

These records are of the whole of the two litters of eleven pigs each until they were 22 and 20 weeks old respectively. From then until they were 28½ and 26½ weeks old respectively, the records refer only to the five selected pigs of each litter. The average live weights on the 17th September apply to the two pigs of each litter exhibited, and one of these pigs was slaughtered for carcass appraisal.

The cash returns shown in the table are the average received for eight baconer pigs from these two litters.

The records of the two litters entries number 3 and 4 in the baconer class of the competition are summarized in Table 1 on the following page.

TABLE 1.

	Entry Number Three. Dam: Longerenong Superior 10th. Sire: Promview King 105th.	Entry Number Four. Dam: Longerenong Primrose 37th. Sire: Promview King 105th.
Date of birth of litter	26th February, 1941	12th March, 1941
Number of pigs reared	11	11
Litter weight at 56 days old	417 lb.	417 lb.
Average live weight of two pigs exhibited on 17th September, 1941	223½ lb. (204 days)	192 lb. (190 days)
Carcass appraisal points of slaughtered pig	63	61½
Percentage lost from live to carcass weight	22.6%	21%
Position in competition	5th	6th
Average food consumption of each pig from 28 days old until disposal exclusive of their mothers' milk and any food they may have obtained from their mothers' troughs during the second month of nursing.		
Bran and pollard	17¾ lb.	6½ lb.
Wheat and barley	564½ lb.	540 lb.
Meatmeal	24¾ lb.	29 lb.
Milk lb. (dry) (1 gallon = 1 lb. dry milk)	31 lb.	48¼ lb.
Weight gained from 27th March (28th day) to 14th September	200½ lb. in 172 days	
Weight gained from 10th April (28th day) to 14th September		174 lb. in 158 days
Ratio of live weight gained to lb. food consumed	1 lb. to 3·18 lb.	1 lb. to 3·58 food
Cost of producing each 1 lb. live weight gained in full period of feeding	2·54 pence	2·96 pence
Total cost of foods consumed per pig	£2 2s. 5d.	£2 3s.
In addition to the foods shown a small quantity of green fodder was given to the pigs daily.		
Average price obtained for all baconer pigs sold		£4 6s. 7½d.
Rail freight to Melbourne, per head		3s. 4d.
Marketing charges, commission &c. (average cost all pigs including porkers)		5s. 11d.
Average cost of foods consumed		£2 2s. 8½d.
Net return per pig over food costs shown above; (costs of producing the sucking pigs, labour, interest on capital and depreciation on plant were not recorded and therefore are not included)		£1 14s. 8d.

With the exception of carcasses appraised at the City Abattoirs, both baconers and porkers were sold on the open market and no information is available to allow detailed prices to be given for individual pigs.

In the porker section of the competition, the litters of the Middle White sows, Longerenong Lucy 39th and Longerenong Pearl 24th, were nominated. The litter of the first sow was sired by the Large White boar, Promview King 135th (6957), the latter by Promview King 105th (6367), the entry numbers of each litter in the competition being 15 and 16 respectively. The treatment and feeding of these litters was similar to that given the baconer entries, but the period of self-feeding was discontinued from the twelfth week. At this age six and five pigs respectively were selected from each litter and trough fed until despatched to market. Gains made by pigs from Longerenong Lucy 39th were steady and consistent. From the age of four weeks they averaged 40·1 lb. at 56 days, 70·3 lb. at 84 days, while at 112 and 127 days the weights were 107·5 and 127·5 lb. This was the only litter that did not show a rise in cost of feeding during the final period of a fortnight. Although the grain ration was reduced to a minimum the milk remained the same, and this suggests that the animals would have finished and produced a better carcass at cheaper cost had the grain been reduced at least one week earlier. The cost of feeding each pig averaged £1 per head against 18s. for the pigs from the litter of Longerenong Pearl 24th.

The same evenness was not shown by the pigs from the latter sow, which was showing signs of age and impaired milking capacity. Some at weaning time weighed under 25 lb. each while the top weight was 44 lb., the litter average was 34·4 lb. The most notable feature of this entry was the rate of growth shown by the five selected pigs between their 84th and

112th day from birth. In this four weeks period they gained an average of 42·8 lb. per head at a food cost of only 1·93 pence per lb., the lowest of all litters for this period.

Their food was restricted during the last fortnight, and only 16 lb. was added to their individual weights, the cost rising to 2·72 pence for each lb. increased during the period.

Although these litters produced the first and second prize winners of the porkers, it must be pointed out that in neither case did the carcass of the slaughtered pigs have the correct proportion of fat to body weight, both carrying more than desirable. The actual carcass weights were 105 lb. and 108 lb. As these pigs immediately before slaughter weighed 134 lb. and 138 lb. their dressed weights showed a loss in offal of 21·6 per cent. and 21·7 per cent. respectively.

The records and food consumption of each litter are set out in Table 2, and they represent averages taken from the whole litters until they were twelve weeks old and from then until dispatch; the records apply to six and five pigs respectively from the two litters.

TABLE 2.

—	Entry Number Fifteen. Litter of Longerenong Lucy 39th.	Entry Number Sixteen. Litter of Longerenong Pearl 24th.
Date of farrowing	10th May, 1941	10th May, 1941
Number reared	10	10
Litter weight at 56 days old	401 lb.	344 lb.
Average live weight of the two pigs entered on 7th September, 1941	129½ lb. (131 days old)	133½ lb. (131 days old)
Carcass appraisal points	63 First in competition	60 Second in competition

Progressive Average.—Gains and feeding costs for each pig, excluding the sows' milk and any food obtained from sows' trough during the month prior to weaning.

Period.	Method of Treatment and Feeding.	Total Foods Consumed.	Weight Gained in Period.	Lb. Food Used to Make Each 1 lb. Live Weight Gain.	Cost of Producing Each 1 lb. Live Weight Gained.	Total Foods Consumed.	Weight Gained in Period.	Lb. Food Used to Make Each 1 lb. Live Weight Gain.	Cost of Producing Each 1 lb. Live Weight Gained.
		lb.	lb.	lb.	pence.	lb.	lb.	lb.	pence.
8th June to 5th July	Suckling sow "Creep" self-feeder to supplement ration	51·04	25·4	2·1	1·66	42·75	21	2·03	1·74
6th July to 2nd Aug.	Paddock run with self-feeder	96·9	30·2	3·2	2·63	67·35	22·9	2·94	2·43
3rd Aug. to 30th Aug.	Hand-fed twice daily in finishing pen	92.8	33·6	2.76	2·32	97·4	42·8	2·27	1·93
31st Aug. to 14th Sept.	Same as above but quantity of food restricted	53	20	2·65	2·24	51·15	16	3·19	2·72
127 days totals		293·74	109·2	2·69	2·20	258·65	102·7	2·52	2·11
Average food consumption of each pig*		Bran, 4·95 lb.; Wheat, 242·62 lb.; Meatmeal, 17·17 lb.; Milk (dry), 29 lb.				Bran, 3·45 lb.; Wheat, 210·23 lb.; Meatmeal, 16·77 lb.; Milk (dry), 28·2 lb.			
Average cost of feeding each pig		£1				18s.			

* A small daily allowance of green fodder has not been included in above food consumption figures.

In arriving at the cost of the various foodstuffs the farm valuation of 3s. 9d. per bushel was placed on wheat, while barley was valued at 2s. 9d. The cost of bran and pollard was taken at £6 per short ton, meat-meal at £10 per short ton, plus freight, making it 1¾d. per lb. on the farm, while milk was valued at 1d. per gallon.

To simplify the calculations 1 gallon of milk was taken as equal to 1 lb. of dried milk, therefore all foodstuffs were totalled on a dry basis. The returns from the sale of the eleven porkers from the two litters averaged £2 14s. 3d. each. If the same expenses are deducted as for marketing of the bacon pigs the net return after deduction of feeding costs averaged £1 6s. per head.

These records show the possibilities of litter testing when fully applied to stud pig breeding. Unfortunately, the work involved is beyond the ordinary pig raiser, but if a pig testing station were established in Victoria, testing of the stud stock at least would lead to a much needed improvement.

Tubercle Free Herds

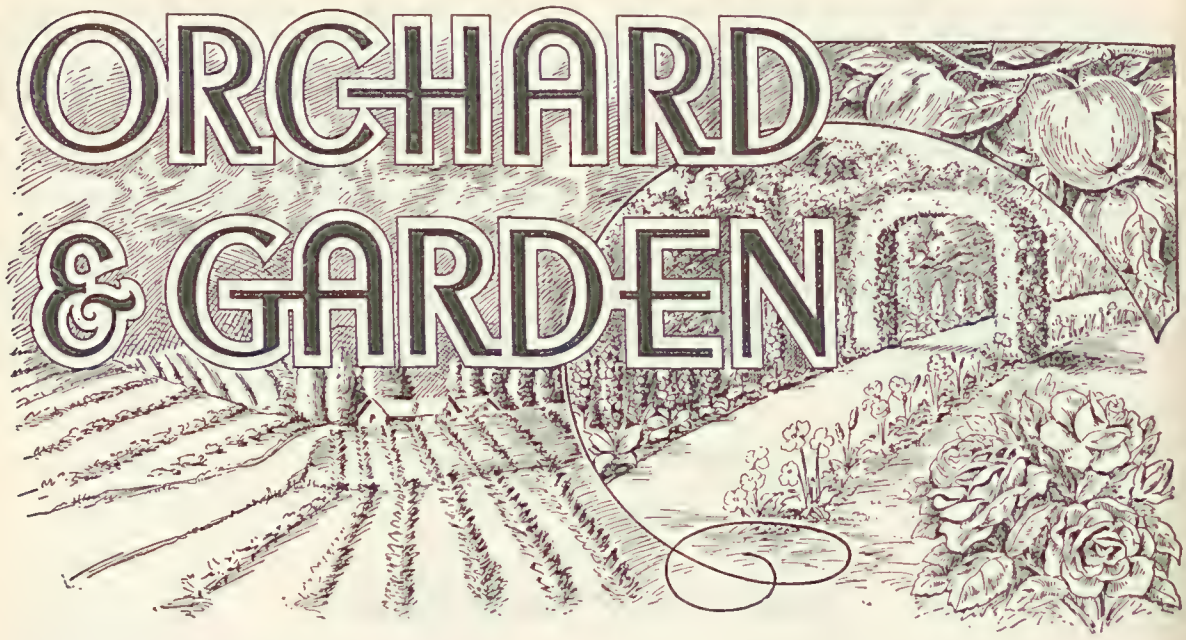
The following herds have been declared free of tuberculosis under the scheme conducted by the Department of Agriculture. Under this scheme a tuberculosis-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

ACCREDITED TUBERCLE FREE HERDS.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp...	Ballarat	78	Onley, W. H. ..	"Glenholme," Caldermeade	64
Banyule Stud Pty. Ltd.	Heidelberg	38			
Dennis, Mrs. A. A. ..	Frankston	33	Payne, A. E. T. ..	"Yarra View," Lilydale	77
Dookie Agricultural College	Dookie	78	Payne, T. E. N. ..	"Woodburn," Kilmore	58
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15	Powell, T. S. ..	"Carellen," Mansfield	45
Geelong Grammar School	Corio	58	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield ..	30
Gorman, A. W. ..	"Catheart," Alexandra	61	Samuel, B. T. ..	Lang Lang ..	60
Henderson, J. L. and E. I.	Wangaratta ..	95	School of Horticulture..	Burnley	9
Holloway, R. W. ..	Caldermeade ..	56	State Experiment Farm	Rutherglen ..	51
Lawrence, P. H. ..	"Rainga," Tarravarra	60	State Research Farm ..	Werribee	211
Longerenong Agricultural College	Dooen	47	Wells, W. G. ..	Caldermeade ..	62

In addition to the above-mentioned herds there are 135 commercial dairy herds containing 5,040 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 99 herds in which 4,911 head of cattle have passed one test, and may be considered, therefore to be in process of becoming tuberculosis-free herds.



In the Garden

By J. L. PROVAN, B.Agr.Sc.,
Senior Horticultural Instructor

The Dahlia.

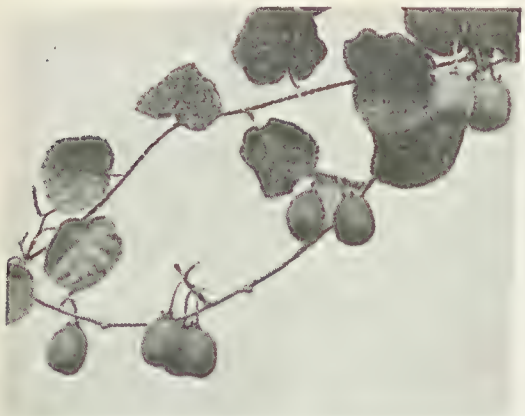
THE dahlia has earned a place in the garden because of its many forms and varieties, long-flowering habit, suitability for bedding effects in the garden, and value as a cut flower. Planting of both tubers and green plants should have been completed in December. During January, the tender shoots, which grow so rapidly, should be tied securely to stakes. As the growth of the plants increases, frequent and thorough watering is necessary. A mulch of stable manure will be beneficial, or, in its absence, a few handfuls of blood and bone manure per plant may be applied, lightly forked in, and then covered with partially decomposed organic matter, e.g., garden refuse. Liquid manure and further fertilizer applications will be necessary to prolong the period of blooming and to maintain the size and colour of the flowers. Disbudding must be practised where large blooms are required. When tying the shoots, the growing tips should be examined. These sometimes become distorted, and the leaves fail to open normally. Closer examination reveals that the leaves have been pulled together by a fine web and portion of the young leaves, and frequently the flower buds, have been eaten. The keen observer will notice that an active green larva will wriggle out of its hiding place and try to escape as the folded leaves are separated. This is the larva of the Light Brown Apple Moth, and it is better to gently squeeze the folded leaves between the fingers, and destroy the larva, rather than to search for it.

Shrubs and Climbing Plants.

A small, compact, evergreen shrub which grows only about 18 inches high, but always attracts attention because of its beautiful, blue daisy-like flowers, which are produced all the year round, is *Agathaea coelestis*, also called Blue Marguerite. This native of South Africa is a very hardy and useful plant either in the rockery or in the foreground of the shrubbery.

A spectacular evergreen plant which always pleases during the summer because of its large, bright-scarlet flowers, and its glossy, dark-green leaves is **Hibiscus, General Corteges.** It should be planted against a wall facing north, and requires protection against frost.

After the Wichuraiana rambling roses, e.g., **American Pillar, Dorothy Perkins, Hiawatha** and **Lady Gay** have completed their blossoming, the old flowering shoots may be removed and the young growth trained into position to provide blossoms for next year. As soon as the flowers fade on other types of roses, they



The Chinese gooseberry—(Actinidia Chinensis).

should be removed by cutting back to a well-developed bud facing in a suitable direction. The main stems of rose bushes sometimes become covered with a white scale. This insect pest can be controlled by spraying with summer White Oil emulsion—1 part in 50 parts of water.

The Chinese Gooseberry—*Actinidia chinensis*—is a vigorous climber, with large, heart-shaped leaves and white flowers about 1½ inches across, which later become buff-yellow. The flowers are followed by an edible fruit which resembles a passion-fruit in shape, but is brown in colour and covered with hairs. It is necessary to obtain both a male and a female plant, because flowers of only one sex are borne on each vine.

Annuals.

Seed of *Antirrhinum* can still be sown, preferably in its permanent position. **Sunnybrook** (tango shade), **Fordhook Rose** (clear rose pink), **Orchid** (mauve-pink), **Ruby** (glowing deep red), **Old Gold** (tangerine and salmon), and **Moonlight** (rich tango and carmine) are all attractive, tall-growing varieties. Good intermediate varieties are **White Rock** (pure white), **Winter Helen** (salmon pink), and **Ruddy Glow** (orange scarlet).

Iceland Poppy, pansy, nemesia, calendula and stock seed may be sown. For this time of the year, partial shade is necessary for the seed-bed, and watering must be attended to regularly. Among the Iceland Poppies, **Glendon Giants, Gartford Giants, Coonara Pinks,** and **Sunbeam** mixture are good strains.

Seedlings which have been planted earlier will require hoeing, mulching, and frequent watering. When hoeing, the soil should be left rather lumpy, particularly if it has a tendency to run together during watering. This will assist water penetration. If a mulch of strawy stable manure or a light dressing of fowl manure containing plenty of litter, is put over the freshly-hoed soil, it will assist in keeping the surface cool and moist, and encourage the root development of the young seedlings.

VEGETABLE GROWING.

Thorough watering and constant cultivation are essential in the vegetable garden. Mulching with stable manure, fowl manure, or even compost material, will be found very beneficial during the summer months.

Beans.

Any of the following varieties of French beans can be planted early this month:—**Brown Beauty** (noted for its long, tender straight pods), **Hawksbury Wonder** (a cross between Keeney's Stringless Green Refugee and Tweed Wonder; a heavy cropping, dwarf, early-maturing bean with long pods of good quality), **Burnley Canadian** (a selection showing marked resistance to Halo Blight, while retaining the good qualities of Canadian Wonder). French beans should be planted 2 inches deep, about 9 inches between plants in rows 2 feet apart. Beans should be ready for picking in about 50 to 60 days. In loose, sandy soil, several light stakes about 2 feet long, threaded through the foliage and then stuck in the ground near the base of the plant will prevent the tender stems of these plants from breaking, and keep the pods from contact with the soil.

Carrots.

Carrot seed, sown early in January, will produce carrots for the late autumn and early winter months. The seed should be sown half an inch deep in rows about 18 inches apart, and the young seedlings are thinned out later to between 2 and 3 inches apart. If the seed is covered with a little soil and then a light dressing of sieved stable manure is placed over it, germination and good early growth will be promoted. The most popular carrot varieties are **Chantenay** (a stump-rooted, rich, orange-coloured carrot of good quality), **Early Horn** (a reddish-fleshed, early-maturing carrot), **Long Bunching** (roots about 9 inches long, and stumpy), and **White Intermediate** (the best white carrot for table).

Lettuces.

Salads are very much appreciated during the summer months, and lettuces form the basis for the majority of them. Continuous small plantings should be made to ensure a succession. The period from seed sowing to cutting is about two months. The plants should be grown quickly, and some form of nitrogenous manure should be applied frequently to obtain quick leafy growth and hearting. Imperial "F" is one of the best varieties to grow.

In the Orchard

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

Artificial Fertilizers.

IN view of the shortage of some artificial fertilizers orchardists will be searching for substitutes. In the February issue of the *Journal* an article on the Unit Value of Fertilizers and also a list of the registered fertilizers available in Victoria will be found. Both article and list should be carefully studied by the fruit-grower to enable him to assess the value of the manure he has been accustomed to use in the past, and also the value of any substitute he may have to use in the future. It is advisable for growers to purchase only registered brands which have a standardized composition. When deciding upon a change in the fertilizer application, attention must be given to the nitrogen, phosphoric acid, and potash content. The former of these ingredients is the most important one for the majority of our orchard soils, which, generally speaking, are of low fertility. Orchardists who have been in the habit of using sulphate of ammonia and who now may have to use an organic form of nitrogenous fertilizer, will require to apply from three to four times the amount per tree in order to give an equivalent amount of nitrogen. There is evidence which shows that the fruit tree absorbs nitrates from the soil during the summer and autumn months. This food is used in the development of blossom buds for next year's crop and the remainder is stored for spring growth and fruit-setting requirements. Trees carrying heavy crops of fruit generally show symptoms of nitrate depletion in the pale colour of the foliage. Such trees should receive a nitrogenous fertilizer during summer or early autumn.

The Codling Moth.

In apple and pear orchards where codling moth damage in the past has been light, arsenate of lead spraying during this month may not be necessary. The number of moths trapped in lures in previous years during January has been low in these orchards, indicating that a lull in spray applications could be observed without seriously affecting the final results. Of course, it is still very important to confirm this position by means of records from moth lure pots. In the more heavily infested orchards moths may be active in January and a spray will be required.

Budding of Stone-fruit Trees.

Stone-fruit trees may be budded during this month. The best results will be obtained when the buds are inserted into the present season's wood, but two- or even three-year-old wood can be budded. Buds should be put in near the base of these shoots which should be spaced around the tree which is being reworked, so that a well-balanced framework will be made. Three or four weeks after budding, the buds and ties should be inspected and the ties loosened, otherwise they will cut into the limb as it expands in diameter. These summer buds remain dormant until the top growth is cut back in early spring. Where buds have failed, fresh ones may be inserted if the bark will still lift easily, but if not the limb may be cleft-grafted or bark-grafted in the following spring.

Red Scale on Valencia Late Orange Trees.

Valencia Late oranges are still being harvested and because of the presence of this late fruit on the trees the control of Red Scale on this variety is generally a more difficult problem than on other orange trees. Growers should label infested trees clearly so that they will receive particular attention during fumigation or white-oil emulsion spraying. In badly infested groves a combination treatment—spraying followed by fumigation—will give very good results.

By RACHEL M. PEILE, Fruit Preserving Expert.

NOW that apricots and peaches are plentiful, housewives are considering the best uses to which these fruits may be put, and the following suggestions should prove helpful in this regard.

As well as the usual bottling and jam-making, drying is an excellent way of preserving the fruit for use later in the year, while pulping is a quick method for putting down large quantities of surplus fruit. Butters made from apricots and peaches should be better known, as they are delicious when used for sandwiches or spreads.

Methods for bottling and drying, and recipes entailing the use of both fresh and dried fruits are given below:—

Bottling (Apricots).

Choose sound, clean fruit—Trevatts and Tiltons give the best results, but any variety may be used. Wash well, and where economy of space is desired, halving the fruit is advised; but for a showy and attractive pack, many prefer the whole fruit where the perfect shape can be retained. Pack the fruit as firmly as possible into the jars. Pour in cold water and swill around the jars to wash away any small particles that may be present after the packing. Pour this water off, and place in the jars one tablespoon of cold syrup, made previously (3 oz. sugar to 1 pint water). Place the jars on the platform in the sterilizer, into which should be poured cold water to just below the level of the platform. Place the lids loosely on top of the jars and sterilize the fruit for 20 to 25 minutes. Overflow with boiling syrup, and seal down immediately with sterilized rubber rings. Allow the jars to cool on a damp cloth and store away in a dark cupboard.

Bottling (Peaches).

Any variety of peach may be used, but the cling peaches and Golden Queen give the best results. They should be peeled, but may be left whole or cut as desired.

To remove the stone from the clingstone varieties, take a sharp knife, and before peeling, cut the fruit right round close to the stone, then twist the halves in opposite directions, when they will separate easily, and then with a pitting spoon or sharp-edged teaspoon cut out the stone.

The halves may be peeled either by hand, with a sharp knife, or by immersing them in a boiling caustic solution. To each quart of water, allow 1 oz. caustic soda (about 1 tablespoonful), and when boiling put the peaches in a fish kettle or piece of old clean linen, and suspend in the soda dip for 20 to 30 seconds (according to stage of ripeness) and then rinse in several changes of fresh cold water, when all the skin will have peeled off, leaving a smooth

clear surface. This dip is suitable for the hard-fleshed peaches only; the softer varieties should be dipped in boiling water or peeled by hand; the latter method is a slow process, and if treated this way, the fruit should be put into slightly salty water while the desired quantity is being prepared, then rinsed, packed in jars, and at once covered with cold syrup. Sterilize the soft varieties about 30 minutes, and the hard yellow fleshed kinds, 45 minutes.

Peach and Pineapple Jam.

6 lb. clingstone peaches,
6 lb. sugar,
1 medium pineapple.
Juice of three lemons is an improvement.

Sprinkle a small portion of the sugar on the sliced peaches overnight; next day add the diced pineapple and simmer the fruit until soft, then add the remainder of the sugar and lemon juice and boil till a good consistency.

Apricot Chutney.

3 lb. apricots,
1½ pints vinegar,
1 lb. sugar,
1 lb. onions,
1 dessertspoon salt,
Pinch of cayenne,
4 teaspoons of whole spice,
½ lb. sultanas.

Stone and cut up the apricots and onions. Tie the whole spice in muslin. Simmer all the ingredients in the vinegar till of a good colour and consistency (about 1½ hours). Bottle and seal while hot.

Apricots (Dried).

Apricots for drying should be ripe, but not mushy. They are usually cut in halves, and when used for commercial purposes are generally sulphured, but this process is not necessary for home use. The drying may be undertaken in the open air or in a very cool oven. When dried in the open air, place the halved apricots on trays. If using wire trays, they should be covered with cheesecloth or muslin. Leave outside in warm air if possible until drying is effected. The period required for drying will depend largely on weather conditions, varying from two and a half to four days. All the pieces of fruit will not dry together, and some must be collected from the trays sooner than others. When sufficiently dry, the pieces should be pliable, and when twisted in the fingers should have no sign of juice, or be mushy. They are then ready for "conditioning." To effect this, the fruit should be removed from the trays and placed in heaps, so that the over-dried specimens may absorb surplus moisture from those not quite dry enough. If there be any dew or rain, the fruit should be protected.

Peaches (Dried).

The yellow, firm-fleshed, free stone varieties are the best for drying. They are treated in almost the same way as apricots, and the finished article is tested in the same manner. Peaches, however, usually require a longer time to dry than apricots.

Dried Peach Jam.

1 lb. dried peaches,
2 quarts water,
4 lb sugar,
2 large lemons.

Cleanse the peaches and soak overnight in the water. Next day, simmer till cooked, adding the juice of the lemons. Add sugar and boil till of good consistency.

Dried Apricot Butter.

¼ lb. dried apricots,
¼ lb. sugar,
2 eggs,
2 oz. butter.

Wash and soak apricots overnight. Stew in a little water. Press through a sieve. Melt butter, add apricot puree, add beaten eggs and sugar. Stir continuously till thick. Pour into small pots and seal when cold.

Pulping (Apricots and Peaches).

Peel the fruit thinly and stone. Cut into slices. Put the slices into a preserving pan with a small amount of water to prevent burning. Boil the pulp well for 20 minutes, then pour it while at boiling heat into hot sterilized jars. Seal down immediately, using sterilized rubber bands. All utensils needed for pulping should be sterilized, and an essential point to be remembered is to seal the containers while at boiling heat.

Contents.

FEBRUARY, 1942

		PAGE
Pyramid Hill Pastures	*A. Morgan, B.Agr.Sc.*	53
Fungicides and Pest Destroyers		59
Construction of Sheep Yards	*N. A. Bowman*	60
Artificial Fertilizers Registered for 1942	*W. C. Robertson, Chemist*	62
Accredited Brucellosis-free Herds (Swine)		64
Certified Pullorum Tested Flocks		65
Wet Mash Feeding		66
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	67
Hopetoun Crop and Fallow Competition, 1941	*H. L. Hore, B.Agr.Sc.*	71
Potato Manurial Trials—Results for 1940–41	*G. H. Mattingley*	75
Potato Stabilization Plan		86
Garden Notes	*J. L. Provan, B.Agr.Sc.*	89
The Control of Ants		90
Fruit Preserving	*Rachel M. Peile and Mary D. White*	91
Neutralization of Sour Cream for Buttermaking—Part 3	*F. S. J. Newman, B.Agr.Sc., and W. J. Wiley, D.Sc.*	95
Seed Certification in Victoria—List of Registered Growers for 1941–42		99
List of Registered Fertilizers—Analyses and Unit-Values		102
Tubercle Free Herds		108

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

For Cooler Smoking . . . Finer Flavour

IN THE SMART GREEN & GOLD PACKS . . . .

also . . . FINE CUT and READY RUBBED

850-10.40

HAVELOCK

Flake Cut Tobacco

INDEX TO ADVERTISEMENTS

FRONT SECTION

Dunlop Perdriau Rubber Co. Ltd. ... iv

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) ... ... opp. p. 63

Goodyear Tractor Tyres ... ... opp. p. 62

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. (Farmall-A Tractor) v

Law Somner Pty. Ltd. (Seeds) vi

Leggo, Victor, & Farmers Ltd. ... inside cover

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ii

BACK SECTION

Australian Cement Ltd. ... ... inside cover

Bayer Pharma, Ltd. (Ceresan) vii

Blyth Chemicals Ltd. viii

Cockbill, J. vii

Commonwealth Serum Laboratories outside cover

Cooper Engineering Co. Pty. Ltd. ... opp. p. 99

Davis Gelatine Pty. Ltd. ... ... opp. p. 35

Jeyes Fluid vii

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 98

Lysaght Bros. & Co. Pty. Ltd. ix

Rylands Bros. (Aust.) Pty. Ltd. viii

State Savings Bank x

Trewhella Bros. Pty. Ltd. xi

Victorian Railways x

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Journal of Agriculture, Victoria—February, 1942.

Pyramid Hill Pastures

Sub. Clover and Wimmera Rye Grass Predominate

Report of the Judge, A. Morgan, B.Agr.Sc., Irrigation Field Officer.

Preparing land for irrigation—grading and check-banking on the border system.

THE only mixture represented in the Pyramid Hill Pasture Competition for the 1941 season consisted of subterranean clover and Wimmera rye grass. High production, shown by the figures for carrying capacity and also the quantity of herbage on the paddocks at judging, were features of the exhibits, but, as stressed in the report on the previous competition published in the February, 1941, issue of this Journal, the standard of lay-out for irrigation was not high. Several pastures appeared to be excellent from the fence-lines, but considerable blemishes were revealed on closer scrutiny. These were due, primarily, to lack of grading or to incomplete grading.

Species of Rye Grass.
1.—Rigid Rye Grass; 2.—Drake or Danel; 3.—Wimmera Rye Grass; 4.—Italian Rye Grass; 5.—Perennial Rye Grass.

Some exhibitors appear to hold the opinion that "lay-out" means the construction of a large number of checkbanks; others, that it is essentially a matter of very short runs. It is stressed, however, that perfection of grading is the principal item in correct lay-out for irrigation. The suitable length and width of bays (checks) are subject to great variation according to conditions in each paddock, and are determined by slope, soil-type, and the crop grown. As the slope increases, banks must be put closer together; if side-fall is appreciable, narrow bays are necessary; on plain land, provided drainage can be carried out effectively, much longer runs are permissible than on silty or sandy soils or on the box and lignum soils, all of which take water more readily than the plain. Long runs are more suitable for the

subterranean clover-Wimmera rye grass combination than for lucerne or for permanent pastures of perennial species, mainly because the number of waterings required for the annual pasture is much less, and waterlogging and the growth of weeds, such as rushes, are less likely, while the waste of water through penetration to depths not tapped by the plants is less.

In most large paddocks there is a ridge or depression of such size and disposition that it is not economical to attempt to grade it out. In such circumstances, it is cheaper and easier to put in an extra channel and drain.

Subterranean clover and Wimmera rye grass are of considerable value in the Pyramid Hill district, but up to the present they have received rather scanty attention from local farmers. It is thought, therefore, that some notes on these species, some hints on when and how to sow them, and also some points in regard to management, may be acceptable.

Wimmera Rye Grass.

The recorded history of Wimmera rye grass in Victoria began in 1919, when Mr. H. A. Mullett, Director of Agriculture, described it in the May issue of the *Journal of Agriculture* for that year. From his inquiries, it appeared that the grass had become established on a farm at Noradjuha over 30 years before, from seed brought from Europe. Seed had been harvested and distributed to Mallee and Wimmera farmers, and, in some cases, as at Mr. H. McDougal's Minyip property, where the average annual rainfall is 17 inches, its spread was rapid. A sowing of 5 acres on Mr. McDougal's farm was responsible for the spread of the grass over 3,000 acres by 1919. A free-seeding habit, and the ability of the seed to "strike" on the surface, promoted its ready establishment over large areas.

Various theories were put forward as to the origin of the grass, the most popular being that it was a hybrid between Italian rye grass and perennial rye grass, but this view is not now accepted.

It was natural that selection work should be attempted with this plant, and at Rutherglen and Burnley, early and late maturing types were developed on a small scale, but its normal habit of cross-fertilization was a big drawback to the stabilization of types for various conditions.

Subterranean Clover.

Subterranean clover was first recorded naturalized in Victoria in 1887. Through the interest and energy of a South Australian school teacher the value of the strain now known as Mount Barker was finally appreciated. It has proved a more satisfactory subject for strain investigations, as it is normally a self-fertilizing plant, and strains grown at Burnley for the last twelve years have proved quite stable. In their recent paper —"Studies on the Varieties of Subterranean Clover" (Proc. Roy. Soc. Victoria, Vol. LIII., Pt. II., N.S.)—Aitken and Drake list details of the characters of 50 strains, all of which have so far bred true to strain. It can be seen, therefore, that the plant offers ample scope for investigation. The evidence given in the paper suggests that many Australian strains have their counterparts in all but minor characters in European strains (e.g., Kyneton and Rouen, Bacchus Marsh and Madrid, Wenigup and Rostock). The authors

A single plant of subterannean clover showing the wide spread of the prostrate stems.

point out that the "commonly accepted explanation of the development of district or local ecotypes, by the operation of environment" cannot apply to subterranean clover with the same force as it can to Wimmera rye grass." They argue the "accidental introduction into Australia of many of the varieties as they exist to-day."

Like Wimmera rye grass, however, subterranean clover possesses the same characters conducive to its rapid spread; i.e., free-seeding and ability of the seed to "strike" on the surface of the soil, or, in early strains especially, to sow its seed below the surface.

As subterranean clover also shows a strong response to superphosphate, it is without doubt the most important clover available to-day for the improvement of dry and irrigated farms.

In the irrigation areas where it is most valuable, especially in districts with small water-rights and no guarantee of frequency of supply suitable for growing perennial pastures, it has consistently gained in popularity, but not yet to an extent commensurable with its real value. This has been due partly to apathy to anything new, and partly to unwillingness to put in the work necessary to make the land suitable for irrigation methods which will grow the plant sucessfully year in and year out.

The cost, and the method of establishment, do not present any problem of magnitude. Desirable as it is to have good lay-out for irrigation, a great deal can be done on land that is irrigable and reasonably level by merely sowing subterranean clover and manuring it regularly. In fact, most of the exhibits in this competition illustrate this view: they are disparaged as competition paddocks, but nevertheless they have proved a good investment, and it is hoped that "sub.-and-super" areas rapidly increase. In this connexion it is unfortunate that at present the supply of superphosphate has had to be rationed.

The cheapest method of establishment is by surface-sowing. That it can be successfully employed in the north has been shown by tests and by the experience of many farmers. On the day of sowing the seed is mixed with the superphosphate and dropped on the surface—any implement, whether spreader, broadcaster, drill, or combine, will do the job if it will spread the superphosphate. The results are better where a short cover of barley grass, "root" grass (*Danthonia spp.*), or other herbage is present. Sowing can be done in March-April-May, according to the season, and will give at least a 30 per cent. "strike" of healthy plants. A seeding of 1 lb. per acre will mean a plant for every 3 square feet on the average. Needless to say, the "strike" will be better if the seed is covered by harrowing.

The extra feed from the subterranean clover in the first season may not be considerable, and lenient grazing should be practised to give the plants opportunity to make plenty of seed for the second season's growth. Watering should be continued up to the end of October, unless the weather becomes very hot. In the second season start the growth at the end of February by irrigation, unless, of course, the weather is very hot. Manure regularly, water carefully, and graze leniently, and in three or four years a strong sward will be developed.

With more care at sowing, better initial results are obtained. For example, when putting in a crop of oats or barley, add subterranean clover seed (either Mount Barker or Tallarook) to the manure, or, better still, sow the crop at normal depth and then sow the subterranean clover and superphosphate on the surface and lightly harrow or drag something behind the implement to cover the seed.

In the majority of the early ventures with subterranean clover the above procedure was followed. An additional improvement is to sow in ground which has been watered, and then worked to a good seedbed. Usually, the crop was designed for hay, and watering was likely to be withheld in late spring because of the risk of lodging or rust. When crop is sown solely for green feed the subterranean clover can be given the spring waterings which will ensure a good setting of seed. A light seeding of the cereal (¾ bushel per acre) is preferred, otherwise in a good season the clover is likely to suffer from smothering.

While the methods described can be relied upon to give results commensurate with the care taken, more expensive methods will give more profitable and quicker results. The usual development under irrigation is that subterranean clover established by rough-and-ready means gives such satisfactory carrying that increasing care is given to subsequent sowings. Perfect conditions for sowing can be provided by attention to good grading, moist seed-bed, proper lay-out of channels, banks, and drains, early sowing, heavy seeding of subterranean clover (up to 7 lb. per acre), light seeding of Wimmera rye grass (not more than 6 lb. per acre and preferably 4 lb. per acre).

Good grading cannot be accomplished in one season on crabholey land. If annual crops are grown for a few years and the grading is improved between each sowing, the levelling will be more permanent. Small banks, and not too many of them, will be found most satisfactory until the final stage is reached. A contour survey will be found to be worth a good deal more than the fee charged by the State Rivers and Water Supply Commission. However, before requesting that this be made, the land should be smoothed out to a reasonable extent. In addition to indicating the extent of further grading necessary, the survey will show the correct course of the channels and drains, most convenient positions for stops, and the direction and spacing of the checkbanks.

A plant of subterranean clover showing prolific production of burrs. Each burr contains an average of three seeds.

Early sowing in the northern irrigation districts takes place at the end of March, or, if the weather is too hot, as soon as possible after that time. The reliability of the autumn rainfall in the north, according to the records of the last 60 years, is not good, and one must be prepared to safeguard the investment in preparation and seed by judicious irrigation. Sowing on well-worked, watered ground is preferable, but under reasonable weather conditions with rye grass and clover, if sown shallowly, can be watered up successfully. Time should be available for a second watering, if necessary, before the irrigation season ends. An early start, before cold winter conditions begin, will ensure good feed in the winter and a quick start and heavy growth in the spring,

Heavy seeding, although it may appear expensive to begin with, saves a year in establishment, and is now fairly widely practised. A seeding of 7 lb. per acre should give an average of seven or eight plants to the square foot, and with normal runner development a good sward is obtained in the spring.

A light seeding of Wimmera rye grass is advisable. In the competition under review, one paddock was exhibited which had been sown with 12 lb. per acre of rye grass and 7 lb. per acre of subterranean clover. On a "plants per square foot" estimate, it appeared that about 4 lb. per acre of the subterranean clover had been smothered by the dense growth of the Wimmera rye grass. With subterranean clover at 1s. 3d. per lb., the loss represented the cost of a season's topdressing. (Note.—The extra-heavy seeding was given because the area had been a windblown stretch of hard clay, and it was expected that germination would be poor.) Rye grass grows rank and coarse in the first year, and in a wet winter it is difficult to control it by grazing and prevent loss of the clover. Most important, Wimmera rye grass, although a good fodder, does not respond strongly to superphosphate. It exhausts rather than improves the ground; on the other hand, subterranean clover is a soil-improver and pays more permanently for initial heavy seeding.

In addition to better preparation of the land for even and economical watering, ways in which major improvement in subterranean clover paddocks in the district can be effected are by subdivision and by the elimination of waste in feeding off. Subdivision, although not vitally necessary to prevent undue waste,

PASTURE COMPETITION AWARDS, PYRAMID HILL DISTRICT, 1941.

Exhibitor.	Lay-out.	Mixture.	Condition.	Uniformity.	Freedom from Weeds.	Total.
Maximum Points	20	20	20	20	20	100
1. L. Malone	17½	18	18	18½	19	91
2. R. H. Mills	15	17½	18	18½	19	88
3. J. F. Wood, C. Wood and Sons	16	17	18	18½	18	87½
	15	17	19*	19	17½	87½
4. A. J. Broad, No. 2	14	15	16	19½	19½	84
5. A. J. Broad, No. 1	13	15	18	18	19½	83½
6. D. Burke	15	18	15	16	19	83
7. G. Brereton	15	17½	13	14	19	78½

* For silage.

is of material help in that direction. Large paddocks usually mean lack of control of grazing. Watering can be better adjusted, on a well-subdivided property, to suit the demand for a continuous supply of green feed. Rankness can be better controlled, and a certain area set aside for hay or for silage. On one property ensilage was being made, and the practice has been permanently adopted. For ensilage, cut early to get better quality and to spread out the work more conveniently. When making pit ensilage, put as much above ground as below, to avoid successive expensive scoopings to maintain the earth covering at ground level.

There is no need for the sheep-man to despise silage. It is often stated that sheep will not eat it, but the truth is that they require a few feeds to become used to it; after that they look forward to the daily ration. In the last few years, with dry autumns and winters, it has proved a great standby on farms in both dry and irrigated areas.

The Awards.

The winning paddock, of 9 acres, exhibited by Mr. L. Malone, was the only one with anything approaching an efficient layout. Mr. Malone stated that the paddock, now about nine years old, was sown with 3 lb. of subterranean clover and 8 lb. Wimmera rye grass per acre. In previous seasons it was topdressed with a bag of superphosphate to the acre, but was not manured this season. Three waterings—in early March, April, and early September—were given. Seventy ewes and lambs were depastured until 1st of September, and the next grazing was to be with 500 sheep. Saffron thistles were stated to have been very conspicuous in the early years of the pasture, but are now practically forced out by the clover. The bays are about 18 yards wide, with drainage gutters along the banks. The paddock consists of better soil than most of the others exhibited, and forms a fairly narrow frontage along a creek. Consequently, the runs are short. Attention had been paid to the channel to maintain a good flow of water, but like most delvered channels it had relatively poor banks. The sward was fresh and at a stage appropriate for efficient grazing.

Second prize was awarded to Mr. R. H. Mills, who exhibited a large paddock which was not conspicuous for good lay-out, but achieved a place mainly on condition, uniformity, and freedom from weeds. Approximately 45 acres of a total area of 50 acres is sown with subterranean clover and Wimmera rye grass, and is divided into 15-yard bays of about 25 chain run. This season's topdressing used up 2½ tons of superphosphate. The paddock was originally a mass of saffron thistles, but has given very good carrying this season, as shown by the following data recorded by Mr. Bruce Mills:—

1. Twelve weeks dry feed for 100 sheep (Merinos) — January, February, March).
2. 20th May-4th June—584 sheep.
3. 12th June-23rd June—584 sheep.
4. 1st July-21st July—58 ewes and lambs.
   22nd July-25th July—95 ewes and lambs.
   26th July-1st August—200 ewes and lambs.
   2nd August-13th August—285 ewes and lambs.
   14th August-25th August—320 ewes and lambs.
5. 6th September-16th September—320 ewes and lambs.
   17th September-9th October—250 ewes lambs.
6. Twenty cattle for three weeks.

The paddock was watered twice in autumn and twice in spring. It could be improved by grading, but it should not be necessary to plough the whole area to do this. Considerable improvement has been effected in grass paddocks elsewhere by ploughing or cultivating high portions and scooping them off into depressions. Previous remarks relating to subdivision apply to this and to other paddocks in the competition.

It might be argued that war conditions have made it superfluous to attempt farm improvement, but the present farm labour shortage must be viewed from two angles—labour is scarce to get things done, but, on the other hand, the efficiency of the farm needs to be increased to maintain normal output of stock and fodders. This can be most quickly achieved by putting as much land as possible into first-class condition in regard to lay-out and pasturage, thereby relieving owners of much poorly-productive work on unimproved areas. Dispensing with annual crops will also mean savings in men, machinery, and fuel—all of which will be a direct contribution to the war effort.

Fungicides and Pest Destroyers

The Standards Association of Australia announces the issue for public critical review of a draft specification to be No. K.83 for Fungicides and Pest Destroyers, including suitable methods of sampling and analysis.

The preparation of the draft was undertaken in the first instance by the Australian Chemical Institute, and though it has had the benefit of thorough review by members of the Institute, circulation for public comment is deemed advisable, that being the Association's normal policy followed in order to ensure that draft Australian standards are brought to the notice of all interests likely to be connected with their use before publication as standard specifications.

The draft has been issued by the Standards Association of Australia in the hope that all chemical manufacturing interests concerned, as well as technical interests connected with agriculture, will review the draft carefully and submit comments for guidance.

The draft is divided into three Parts; Part I. being Schedule of Requirements, Part II. Methods of Sampling, and Part III. Methods of Analysis.

Part I. includes sections dealing with arsenicals, copper compounds, chlorates, creosote, cyanides, dips, lime, lime sulphur solution, nicotine products, spraying oils and emulsions, and dusting sulphur.

Part II. contains the methods of sampling in clauses dealing with fine powders, lumpy material, pastes and liquids.

Part III. sets out the recommended methods of analysis for testing the various groups listed in Part I.

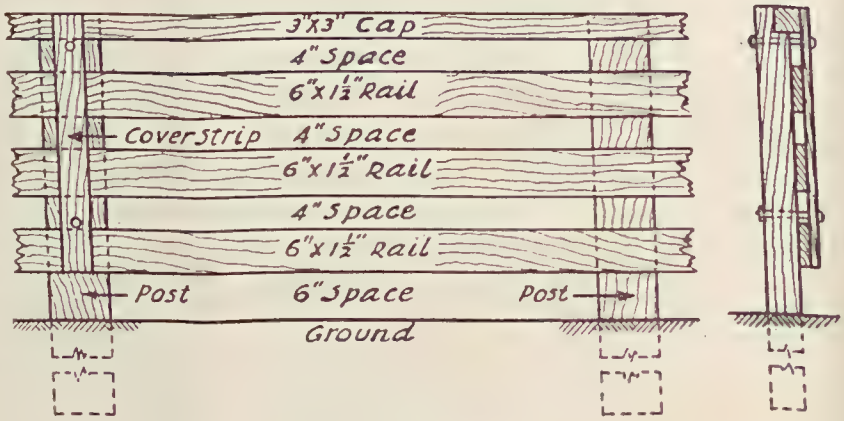
Copies of the draft can be obtained gratis from Standards Association of Australia, Headquarters, Science House, Gloucester and Essex streets, Sydney, or from the Victorian branch at 422 Collins-street, Melbourne, C.1.

Construction of Sheep Yards

A Useful Layout

By N. A. BOWMAN, Sheep and Wool Expert

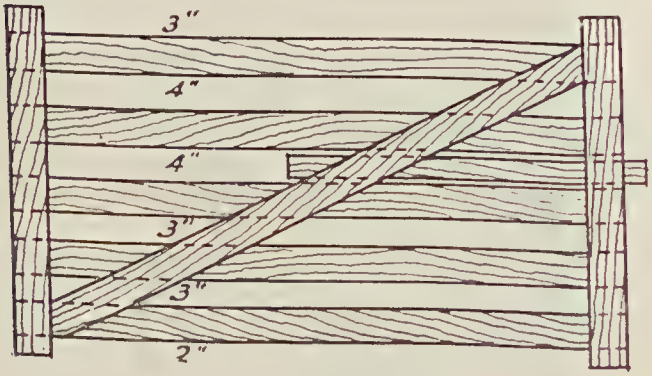
THE following details of construction and specifications for a set of sheep yards were made available by Mr. A. Newcomen, of Ensay. During a visit to Mr. Newcomen's property the writer had the experience of handling and classing sheep in the yards, and found the general layout and construction quite satisfactory. It is considered that the particulars given may be of assistance to sheep owners who propose to rebuild, or lay out a new set of yards. The measurements and position of the outside gates, as shown in the plan, could be altered to suit the builder's requirements, but the inclusion of a drenching and classing race in the yards is to be recommended under all conditions.



Side elevation of fence.

Particulars are given hereunder to assist in following the plans:—

First, erect the end posts of each line. Use round posts for preference. Make them exactly 3 ft. 3 in. above ground. Stretch a line from the top centres of these posts and erect the "in-between" posts with their face along the line, and make them an inch above the line. Then drop the line 3 inches. This will give the bottom of the scarf to be taken out for the cap. Let the cap 1½ inch into the in-between posts, and mortice about 3 inches into the centre of the end posts. Fit caps and nail securely; saw off the pieces of posts protruding above the cap. Measure spacings for 6-in. by 1½-in. rails from the cap down (not from the ground up). This leaves any irregularity next to the ground. Nail rails securely to the sides of the in-between posts and mortice into the end posts. Cover the joins in rails with a piece of 4-in. by 1-in. timber as illustrated, and clamp it on with two bolts through the posts.



Gates made by 4 in. x 1 in. timber.

Care should be taken when swinging the gates that they will open right back against the fence. This prevents sheep from getting behind them. Arrange also to have some form of catch to keep the gate in position when open as well as when closed.

Instead of using nails when fixing rails, a method suggested is to wire them on by making staples of wire and twitching the two ends on the reverse side.

Ground Plan of Sheep Yards.

Artificial Fertilizers Registered for 1941-42

Registrations and Unit Values

By W. C. ROBERTSON, Chemist

SECTIONS 21 and 22 of the *Fertilizers Act* 1928 (No. 3680) provide for the registration of brands for artificial fertilizers which are retailed annually by manufacturers or importers. Every application must be made on the prescribed form. Included in the essential particulars required are (1) the raw materials from which the fertilizer is manufactured or prepared, (2) a statement of the results of a chemical analysis of the fertilizer giving the percentages in which the fertilizer contains the three fertilizing ingredients—nitrogen, phosphoric acid and potash—and the respective forms in which they occur, and (3) in the case where the fertilizer is manufactured in Victoria, the *retail price per ton free on rails at the railway station nearest the place of manufacture,* or where the fertilizer is imported into Victoria the *retail price per ton free on rails at Melbourne.* The particulars set out in the application must be verified by a statutory declaration.

From the results of the analyses of fertilizers set forth in the applications, taking into account the constituents which have a commercial value and the value thereof in the simple fertilizers in which they occur, the average unit values of the three principal plant foods, namely, nitrogen, phosphoric acid and potash, in their respective forms are annually calculated.

Under the National Security (Prices) Regulations, fertilizers are declared goods for the purpose of these Regulations, and prices have been fixed by the Commonwealth Prices Commissioner for three of the main fertilizers, i.e., superphosphate, sulphate of ammonia, and potash salts, which means that the unit values for ammoniacal nitrogen, the three forms of phosphoric acid and potash in the simple

Sampling a parcel of fertilizer in a country store.

mineral fertilizers, are based on approved retail prices. The selling rates of mixed and complete fertilizers manufactured by blending these fertilizers in various proportions have been advanced or reduced in conformity to the amount of the principal fertilizers contained therein. The present selling rates per ton for the principal mineral fertilizers are as follow, with previous selling price shown in brackets:—

Superphosphate, £6 11s. (£4 19s.).
Sulphate of ammonia, £13 (£16 12s. 6d.).
Nitrate of soda, £17 (£15).
Muriate of potash, £20 (£17 7s. 6d.).
Sulphate of potash, £21 10s. (£19 7s. 6d.),

The chemical composition has not changed in the case of any of these fertilizers, and any alteration in the price per ton is solely due to world conditions. The retail price of superphosphate for the current season is subject to a Government subsidy of 25s. per ton, with a proportionate allowance for the superphosphate used in mixed and complete fertilizers. It should be noted that supplies of superphosphate are strictly rationed (see January issue of this Journal) and, in special cases only, are supplies of the other fertilizers made available.

The unit values for the year are interesting. For example, the 1942 figure for 1 per cent. of water soluble phosphoric acid per ton at 6s. 2d. is over 32 per cent. higher than that of the previous year (4s. 8d.), and more than 70 per cent. above the figure in operation in 1940 (3s. 7d.). Water soluble phosphoric acid is the principal constituent of superphosphate, which is easily the most popular and important of the simple fertilizers.

The main reason for the marked increase in this unit value is reflected in the phosphoric acid figure for ground phosphate, which is the basic raw material used in the manufacture of "super." The unit value for phosphoric acid in phosphate rock has increased during the past two years from 2s. 2d. to 4s. 2d., equivalent to more than 92 per cent.

"Blood and Bone" is used extensively in manuring citrus trees.

With the shortage in supply of the main fertilizers, the market gardener, floriculturist, and others practising intense culture, may consider it advisable to use mixed or complete fertilizers—an excellent idea at all times—but more particularly under existing circumstances because of the need to conserve supplies.

The value of the complete or the mixed fertilizer depends upon a thorough mix, so that when it is applied to the soil each plant, tree, or square yard of surface, receives a uniform amount of the fertilizing constituents.

One of the problems in the blending of fertilizers is the segregation of the particles of the different materials due to differences in physical characteristics, which necessitates the installation of suitable machinery and chemical control to assure a homogeneous admixture.

It seems quite a simple matter to mix a few bags of "super." with a similar number of blood and bone, or sulphate of ammonia. So it is, providing there is no responsibility associated with the mixture or on the mixer. To obtain a homogeneous commercial mixture which will be of uniform composition throughout is an entirely different proposition, but nevertheless essential, because (i) to comply with the Fertilizers Act it must be correctly labelled and guaranteed, and any sample withdrawn from a bag or parcel on analysis must prove the mixture true to label and up to the guarantee within the limits allowed by the Act; and (ii) to serve its purpose in practice every pound of the mixture should have approximately the same composition, so that when applied to the soil or crop every square yard of surface, or every plant will receive an equal amount of the fertilizing ingredients.

From recent observations it is necessary to issue a warning against carelessness in the perusal of documents associated with the purchase and payment for fertilizers, but more particularly "mixed" fertilizers containing superphosphate.

All fertilizers containing "super." are subject to the subsidy of 25s. per ton for the proportionate content of this fertilizer. The registered retail price includes the subsidy allowance, which is payable on settlement. So

that, for fertilizers of this description, the statement or account associated with a purchase should read as follows:—

To—

	£	s.	d.
One ton of "Brown's" mixed fertilizer	8	0	0
Freight and cartage ..	0	15	0
	8	15	0
Less Government subsidy ..	0	6	3
	8	8	9

In this illustration it is assumed that the fertilizer contains 25 per cent. of superphosphate, the approximate percentage of which, in any fertilizer, can readily be calculated by multiplying the percentage of water soluble phosphoric acid (which is guaranteed in the registration and shown on the labels attached to the bags) by five, and this figure when divided by four will give the subsidy allowance in shillings per ton. Example: A "mixed" fertilizer is guaranteed to contain 3 per cent. of water soluble phosphoric acid, then:—

$3 \times 5 \div 4 = 3 \cdot 75$ or 3s. 9d.—the subsidy allowance per ton,

which should be shown on the account received in connexion with the purchase.

Any agent or dealer who blends fertilizers under the provisions of the Fertilizers Act immediately becomes a manufacturer of the mixed fertilizer, and is liable for registration fees, &c.

The man on the land who purchases mixed fertilizers of any description is advised (*a*) to see that a brand is registered, (*b*) to demand that the bags be properly branded and labelled, and (*c*) in the case of a superphosphate blend to make sure that the correct subsidy allowance is forthcoming.

The list of registered fertilizers will be found at the back of this Journal.

Accredited Brucellosis-free Herds (Swine).

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen	Horn, L. A.	Leongatha North
Bowran, L. G.	"Glendare," Tallangatta	Longerenong College ..	Dooen
Bright, George H. ..	Dumbalk	Pietsch R. E.	Katyil
Castle, L. H.	Clarinda	Rintoul, J. T. C. ..	Glengarry
Critten, H. S.	Dumbalk	Roy, W. A.	Morrell's Hill, via Boolarra
Dookie Agricultural College	Dookie	State Experiment Farm	Rutherglen
Doornbusch, John L. ..	"Starpark," Nhill	Sutherland, R. N. ..	Nullawill
Fairchild and Clutterbuck	Tinamba	Trenery and Soderlund	"Promview", Foster
Geddes, L. D. ..	Bungaree	Trigg, A. J.	Bungaree
Harrison, C. T. ..	"Eastside" Stud, Pomborneit	Trigg, N. H.	Bullarook
Hawtin, I. E. & F. ..	"Rossmoyne," Colac.	Tweddle, J. T. ..	"Winlaton," Shepparton
Haywood, Dr. A. R. ..	Hastings	Walch, M. U.	Baring

Certified Pullorum Tested Flocks

THE Victorian Department of Agriculture has introduced a scheme for the testing and certification of poultry flocks proved to be free from pullorum disease.

For a number of years examinations of diseased chickens at the Veterinary Research Institute have shown that pullorum disease is responsible for the greater part of the mortality which occurs in young chickens in this State. It is probably the most insidious and destructive disease affecting poultry, and the majority of outbreaks originate in incubators from eggs laid by infected hens.

Each year the Department of Agriculture receives numerous complaints from persons who have purchased one-day-old chickens in which considerable mortality, due to pullorum disease, has subsequently occurred. Even more important than the direct monetary loss to the purchaser is the introduction of an infectious disease to hitherto clean premises.

Fortunately, a great measure of control can be exercised by the detection of infected poultry and their elimination from the breeding stock. The blood test for pullorum disease is a laboratory method for the detection of infected birds, and for several years many poultry farmers have voluntarily undertaken the testing of their breeding birds.

15856/42.—3

The object of the Department's scheme for the certification of pullorum tested flocks is twofold. Firstly, it aims to assist in the eradication of a disease which is the cause of considerable loss to the poultry industry, and, secondly, to afford some measure of protection to purchasers of eggs for hatching and of day-old chickens.

Pullorum disease is scheduled under the Stock Diseases Act, and it is intended, when cases are brought under notice of chickens having died from pullorum disease, to quarantine the premises from which such chickens originated. Steps will also be taken to prevent the advertising for sale of chickens purporting to originate from blood-tested flocks unless such flocks are certified or are in process of being certified by the Department.

Most poultry farmers who desire to take advantage of the Certified Pullorum Tested Flock Scheme undoubtedly will desire the testing to be carried out as early as possible before the breeding season commences. However, owing to shortage of staff at the Veterinary Research Institute, due to the military situation, only a limited number of blood samples can be tested, and, in future, preference for testing will be given to poultry

farmers who make application for certification of their flocks under the Certified Pullorum Tested Flock Scheme.

It is essential, therefore, that poultry farmers desirous of having their flocks tested should make immediate application to the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2. The cost of testing is 10s. per 100 birds, and tubes for the collection of the blood samples will be supplied by the Veterinary Research Institute.

Wherever possible, assistance will be given by Departmental Officers in the collection of blood samples, but in cases where owners have already had birds tested, it is expected that they themselves will arrange for the collection of the samples and their despatch to the Veterinary Research Institute.

The following are the conditions governing the Scheme for the Certification of Pullorum Tested Flocks:—

1. The owner shall supply to the Chief Veterinary Inspector of the Department of Agriculture, prior to the commencement of the testing, a complete list of all breeding birds on the farm, and the methods used for identifying same, and before such testing commences the Chief Veterinary Inspector shall be satisfied that the premises and equipment are such as will allow of the following conditions to be complied with.

2. All breeding birds on the farm shall be submitted to such diagnostic test for pullorum disease as the Chief Veterinary Officer directs, and all such testing shall be carried out at the Veterinary Research Institute, the cost of testing being borne by the owner.

3. Birds reacting to the test shall be disposed of as the Chief Veterinary Inspector directs.

4. After testing, all negative reacting birds which it is intended to keep as breeding stock shall be isolated from all other birds on the farm.

5. Only eggs from non-reacting birds are to be hatched on the farm.

6. If custom hatching is conducted on the property, only eggs from Certified Pullorum Tested Flocks shall be incubated.

7. After testing, no bird shall be introduced into the breeding flock without permission.

8. The certification of a flock shall be for one breeding season only.

9. There shall be published in the *Journal of Agriculture,* Victoria, a list of those flocks which have been certified.

Wet Mash Feeding

A good wet mash can be made of the following materials:—bran 30 lb.; wheat pollard 50 lb.; barley meal, oat pollard or maize meal, 10 lb.; meat meal or dried buttermilk 10 lb., to which is added approximately 20 per cent. of chaffed green feed. The green feed may be fed separately if so desired.

The usual method of mixing wet mash is to mix first the bran and meat meal together, and then add the moisture. When the bran and meat meal are thoroughly moistened, add the other meals and greenstuff, and mix the whole into a crumbly mash, and not into a wet and sticky condition. If cooked meat, such as bullock's heads, sheeps' heads or livers is used in place of the meat meal or buttermilk, the mash is mixed with the soup, and approximately 2 oz. of the meat is fed to each bird weekly. The birds should be given as much of this mash as they will consume in about 20 minutes (approximately 2 oz. dry weight per bird each day).

Care should be taken to keep all feeding utensils and mixing troughs in a clean sanitary condition, and any mash left in the pens by the birds should be removed before it starts to ferment.

The grain should consist of wheat 60 per cent.; oats or barley 20 per cent.; maize 20 per cent., fed in the evening at approximately 2 oz. per bird daily.

Live Stock Notes

Compiled by A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer.

The Advantages of Tidiness.

THE value of tidiness on the farm cannot be expressed in terms of money, but the number of cattle lost each year as the result of having eaten short pieces of wire, nails, staples, old tins, or other matter carelessly left lying about must be considerable. The effort of collecting and disposing of these odds and ends, especially if collected when last handled, would be small and well repaid by the saving in animal life and health. Rubbish likely to cause harm should be thrown into a bin out of reach of stock. This receptacle could be emptied periodically on a site inaccessible to farm animals.

Wire from baled hay is frequently left in the paddock, and is a common source of injury to human beings as well as animals. In addition to causing injuries the practice is wasteful, especially in these times of wire scarcity. The provident farmer will put each strand away carefully, for use during the following baling season.

Machinery also is frequently damaged by odd pieces of wire left lying about. Mowers, reapers, and other machines are sometimes damaged when driven into ploughs, cultivators, or other implements carelessly left in crop paddocks and pastures when last used, instead of being taken to the implement shed.

Nails sticking up through boards, posts, &c., are another danger, particularly to horses. The time involved in putting such objects in a safe place is immaterial when the menace to children and stock is considered. After having removed the nails, these boards and posts should be stacked away if required for future use, otherwise they should be used for firewood.

Barbed-wire fences, allowed to get into disrepair, are another danger to stock. Many fences could be repaired in the time taken in treating teats torn on barbed wire, or badly cut fetlocks and pasterns. The cost of the materials required for repairing the fences would be much less than the loss in milk yield of a good dairy cow, or the value of the time lost through a horse being out of work.

Another sign of inefficiency on many farms is a regularly used gate that does not swing. There is probably no gate that could not be swung properly in less than half a day, yet we find many gates that have to be lifted or

dragged open and shut several times a day for months or even years, until at last they collapse. Bad gates complicate stock movements. For example, a beast may be driven up to a gate such as that described, and, while the gate is being opened, break away again to the back of the paddock. The gate will probably be left open owing to its unwieldiness, and, while the beast is being brought back, other stock may get in or out, as the case may be, causing endless trouble and confusion.

Dairy Cattle.

How Cows Let Down Their Milk.

Why cows are able to let down or hold up their milk is explained by the following theory (Swanson, E. W., and Turner, C. W. (1941), J.D.Sc., 24: 635) :—

Stimuli brought about by the routine of milking, bringing the cow to the shed, the presence of the milker, the clattering of milk buckets, washing the udder, manipulation of the teats, &c., cause nervous impulses or messages to reach the posterior lobe of the pituitary body, a small gland situated on the floor of the skull cavity, and, as a result, a hormone called oxytocin is liberated into the blood. This hormone quickly reaches the udder, where it causes the muscle cells round the ducts to contract, and this increases the pressure inside the udder and forces the milk from the fine ducts into the larger ones and ultimately into the cistern or milk reservoir, from where it can be drawn by the milking process. The cow thus lets down her milk.

On the other hand stimuli, which upset the cow or cause fright, such as loud, sudden noises, unaccustomed treatment or strange conditions, may set up nervous impulses which result in the production of the hormone, adrenalin, by a small gland attached to the kidneys. Adrenalin has the opposite effect to oxytocin, and prevents the rise in sudden pressure, thus causing the cow to hold up her milk.

When adrenalin is liberated into the blood stream before the oxytocin, it is some considerable time before the adrenalin disappears or before sufficient oxytocin is produced to overcome the effects of the adrenalin, therefore most cows which hold up their milk are unable to let it down until the next milking.

Why some cows, which frequently hold their milk against machines, let it down freely to the hand milker when stripping may be explained by the theory that neither forms of stimuli are acting within the cows, and that the milk is held naturally as it is between milkings. The action of stripping supplies the stimulus necessary for the liberation of oxytocin to release the milk. Such cows can usually be machine-milked if they are started before the machines are put on.

The necessity for following a regular routine during milking, and treating the cows individually and consistently cannot be over emphasized if cows are to give their milk freely.

Sheep.

Community Breeding.

There are many advantages in choosing a breed favoured by the majority in a particular district. Stock can be purchased near home from flocks known to be successful. A good local market can be built up for sale stock. Buyers are attracted when a district becomes famous for a particular breed. There is more competition in the show ring and field when others keep the same breed, and thus there is a greater stimulus for raising the standards within the flocks. Good rams could be procured more easily and cheaply.

A great oportunity exists for increased community breeding in Victoria among the breeders of British breeds of sheep, and the abovementioned advantages are only a few that should arise from it.

Green Food or Lucerne Chaff for Pigs.

A deficiency of vitamin A in the diet of pigs predisposes them to several serious infections, retards the growth of young pigs, and leads to infertility of boars and sows.

Vitamin A is obtained by pigs from green pasture or green fodder, but in seasons when green foods are not available trouble is likely to occur unless the green foods are replaced by some other source of vitamin A. Lucerne hay or chaff, which is leafy and green, supplies this essential vitamin, and has other nutritive qualities, which make either fodder a valuable addition to the diet of pigs.

Growing pigs and breeding pigs will eat up to ½ lb. of lucerne hay or chaff per head daily. It should be introduced gradually to the diet.

When green pasture, or green fodder, is not available, the use of green lucerne hay or chaff for pigs is strongly recommended, even in districts where they are not grown and freight has to be added to their purchase cost.

Some farmers who have a limited water supply have established a small plot of lucerne, sometimes only one-tenth of an acre, and by the use of a garden sprinkler have been able to keep up a small but valuable supply of green lucerne for their pigs through dry periods.

[L. A. Downey, H.D.A., Pig Expert.]

Egg Laying Competitions.

Egg production in particular has been developed considerably in many countries, and in this State it is the most profitable branch of poultry farming. For this reason the Department of Agriculture has recognized the value of egg-laying competitions, and established the first Burnley Egg-laying Competition at the Burnley Horticultural Gardens in 1911. These competitions have been continued to the present day. During this period many different breeds of fowls have competed, comprising White, Brown, and Black Leghorns; Australorp (Utility Black Orpington); Partridge Australorp; Rhode Island Red; Rhode Island White; White and Buff Orpington; Silver, White, Golden and Buff Wyandotte; Black Minorca; Andalusian; Black Spanish; Black Langshan; Ancona; Sicilian Buttercup; Light and Red Sussex; Old English Game; Faverolle; Barred, White, and Buff Plymouth Rock; Welsummer; and Barnevelder.

Of these breeds the greatest number that have competed were White Leghorns, Australorps, and Rhode Island Reds, some of which have put up remarkably high scores in egg production.

The Burnley competitions are conducted for 48 weeks, but if a team of six birds, or a single bird, is likely to break the previous record it is retained for a full twelve months (365 days). At the present time the highest twelve months' records for any breed are as follow:—

Team of Six Birds—Australorps—Competition 1940-41.—Laid 1,812 first-grade eggs.

Single Bird — Australorps — Competition 1940-41.—Laid 340 first-grade eggs.

Egg-laying competitions have done more to draw attention to the potentialities of commercial egg production than any other single factor, and they have become a recognized and esential part in the building up of the poultry industry. The results obtained in these competitions have shown that they can have a definite influence in assisting to establish stock of the most desirable quality on commercial poultry farms, and they therefore render a very distinct service to the industry. At the present time competitions are being conducted in all States of the Commonwealth.

The Burnley Egg-laying Competition, conducted by the Department of Agriculture, commences on the 1st April each year. Two sections are provided, as follow:—

Section "A"—for teams of six birds, trap-nested; and

Section "B"—for individual birds, each housed in a single pen.

Prize certificates and sashes are awarded, and the competition is decided on the greatest number of first-grade eggs laid by the birds in the various classes of each section.

The Thirty-first Egg-laying Competition concludes on the 2nd March, and the next competition commences on the 1st April.

Accommodation for 656 birds is provided in the competition, and, as entries for the Thirty-second Egg-laying Competition close on the 9th March, 1942, breeders desirous of entering birds should make their applications to the Superintendent of Live Stock, Department of Agriculture, Melbourne, C.2, as soon as possible to ensure acceptance.

[H. F. Clinton, Poultry Expert.]

Bees.

In most of the forest areas yellow-box and red-gum trees have finished blooming, and, while some reports from the Western District are satisfactory, the experience of most bee-keepers have been rather disappointing, and the average yields have been below normal.

Migratory bee-keepers are looking for better results from the iron-bark, grey-box, and stringy-bark blossom, and are busy moving their bees into areas where these trees are in bud. From the marketing aspect, honey gathered from iron-bark and grey-box blossom is more desirable than that obtained from stringy-bark, but, where bees are in low condition, and all sources are available, it may be advisable to choose the stringy-bark areas with the object of building up the colonies before the winter. Bees working on stringy-bark usually build up stronger colonies and winter better than those in the vicinity of iron-bark and grey-box blossom.

Where swarming is not desirable next spring, a lot of time and worry may be saved by rearing Italian queens during the present month

and re-queening all colonies having old or hybrid queens. Given ample room for brood expansion, autumn-raised Italian queens usually show little desire to swarm during the following spring.

[J. W. Thomlinson, Apiary Inspector.]

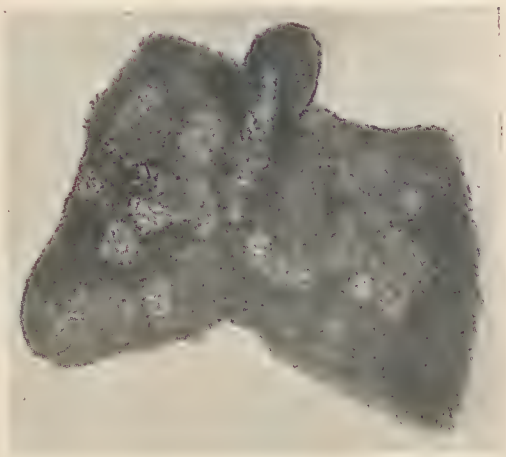
VETERINARY NOTES.

Ringworm.

Ringworm may affect any of the domesticated animals, and also human beings. Cattle are probably most frequently affected, but horses, pigs, dogs, sheep, and even poultry may develop the disease. The cause of ringworm is a parasitic fungus (*Trichophyton*), and it is characterized clinically by the appearance of more or less circular patches on the skin. On these patches the hair is first noticed to be lustreless and erect, and later falls off, leaving the skin bare.

Symptoms.

Ringworm is most often found about the head, especially around the lips and eyes, the legs, and along the neck, but patches may be found on any part of the body. At first the hairless areas are circular and well defined, but may unite and form large irregular patches which frequently show thickening of the skin, the outside layers of which flake off in bran-like greyish scales. They are soon covered by crusts due to small vesicles forming and later rupturing. The crusts are at first dirty-grey in colour, but, due to rubbing, they become admixed with blood and serum, and vary in colour from yellow to brown. The hairs which have not broken become glued together, and sores form which alter the whole surface appearance. Beneath the crusts are often observed numbers of small nodules formed by swollen hair roots and resembling millet seed. The skin may become thickened, wrinkled, and project above the surrounding surface.



Calf with ringworm.
[*After Wooldridge.*

Treatment.

Ringworm responds readily to dressing with tincture of iodine and other alcoholic preparations. Such dressings require repeating at intervals. For bad cases it is as well to prepare the skin first by washing with a warm soapy solution containing 2 oz. of washing soda to 1 pint of water. The scabs may be softened with applications of oil. Other suitable treatments are a lotion containing 2 per cent. of picric acid, or a lotion containing 4 oz. of copper sulphate to 1 pint of water.

The skin immediately surrounding the edges of hairless areas also should receive treatment. It is well to note that man may contract this disease from animals, and in some cases it has proved very difficult to cure. Infected animals should be isolated, pens disinfected, and rugs, brushes, outer clothing, tools, &c., that come in contact with such animals also should be disinfected.

[W. D. Shiew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Hopetoun Crop and Fallow Competition, 1941

Report of the Judge, H. L. HORE, B.Agr.Sc., Inspector of Agriculture

SATISFACTORY yields were obtained from most cereal crops in the Hopetoun district this season, and adequate supplies of natural feed should be available for stock over the summer and autumn months. In isolated cases crops were affected with rust to a degree sufficient to materially reduce the yield, but in general the disease was not serious in the district.

Only five crops and six fallows were submitted for judging. In common with other districts many of the best crops were grown on land which had failed to produce a crop last year, or had been under fallow for two seasons. These crops were excluded from the Hopetoun competition. The estimated average yield of the crops judged was 23 bushels per acre.

Superphosphate on Cereal Crops.

Most farmers are aware of the fact that the Commonwealth Government has decided to ration superphosphate. The necessity for this step has arisen as a result of enemy action, causing a restriction of supplies of phosphate rock. With limited supplies of manure at present, and the uncertainty of the position in this respect for some time to come, every effort should be made to utilize the superphosphate available in the most advantageous manner.

Unfortunately, most of the soils of the State are low in phosphates, which are essential for optimum plant growth. On the other hand farmers for many years have been advised to apply heavy dressings of superphosphate to their land, and where this was done it can be expected that not all the phosphate applied has been used by the crops grown. Some remains in the soil as a residual supply, which will be of benefit to crops for a year or two. That this is actually the case has been shown by the results of experimental trials conducted at a number of centres in the State.

There are some further aspects of manuring of cereal crops which should be reviewed in order to obtain the maximum benefit from the reduced amount of superphosphate available

to the farmer. Practically all cereals show a very marked response to superphosphate when sown on fallow land, but on stubble-sown crops the increased return due to the use of superphosphate is only small. Where the previous crop has been adequately manured, very little loss in yield and an appreciable saving in superphosphate would result if stubble crops were sown without manure.

With the exception of the northern Mallee districts, where the response to superphosphate is not so great, a dressing of 90 lb. per acre of this manure is usually recommended as the most profitable quantity to apply with wheat sown on fallow land. In the better rainfall areas of the State the quantity normally recommended is 1 cwt. per acre, but during the present emergency it will not be possible to follow these recommendations. Many farmers accept the idea that early sown crops do not need superphosphate to the same extent as late sown crops. However the result of eight years of experimental trials conducted at the Mallee Research Station at Walpeup do not substantiate this belief, and it has been shown that early-sown crops require superphosphate to as great an extent as do those sown later. Growers should therefore decide on the average dressing they will apply this year and spread it evenly over the whole of their wheat crop on fallow irrespective of the time at which it is sown. **A dressing of, say, ½ cwt. per acre over the whole of the fallow sown is more profitable than sowing half the area without manure and half at 1 cwt. per acre. Similarly, a light dressing each year is better than double the quantity applied in alternate years.**

The Competition.

Mr. C. E. Carra was successful in winning both the open Wheat Crop Competition and the Aggregate Competition for the wheat crop grown on the fallow, which was judged last year. Although two entries were submitted they included about 30 acres of the same crop and were of the Bencubbin variety, grown on light undulating Mallee land. After being under a crop of oats in 1939, the land was disc-ploughed 3 inches deep in April, combined in September, and cultivated in each of the months January, March and April, and sown in mid-June with 80 lb. of seed and 90 lb. of superphosphate per acre respectively. Seed was dry-pickled before sowing, and the land was harrowed just before the germination of the crop. This exhibit was successful in winning the competition for the Champion Wheat Crop of the Mallee, and a prize of £50 donated by the Royal Agricultural Society of Victoria. The crop was harvested under the supervision of an officer of the Department of Agriculture, and returned a yield of 31 bushels per acre.

Second place in the Open Competition went to Mr. G. G. Marshman with a nice crop of Bencubbin. This entry was not expected to yield as well as that shown by Mr. Carra, but was in all other respects as good as the winning exhibit.

Mr. G. Barnes' crop, which won the Aggregate Competition in the Soldiers' Section, was placed second in the Aggregate and third in the Open Crop Competitions. The variety was Ranee, and although very heavy in yield in places, there were thin patches present in the crop, where the surface soil had been blown away when previously under fallow.

Sheep are a valuable adjunct to a Mallee wheat farm.

The winning fallow entered by Mr. G. J. Marshman was a very creditable exhibit. The area was located on a flat of red loam, and Mr. Marshman has succeeded in producing a nice mulch of good depth and tilth. After being under grass for two years the land was ploughed 3 inches deep with a sundercut late in July, and scarified in mid-September and spring-toothed in November. A few green weeds were present. These, however, could easily be eradicated by the use of sheep.

The details of the awards are as follow:—

Crop Competitions.

Open Crop Competition, 1941—50 Acres of Wheat.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	1940 Fallow Total.	Grand Total.
				Weeds.	Disease.				
Maximum Points ..	—	35	20	15	15	15	100	100	200
C. E. Carra	Bencubbin ..	34	19	13½	12	14	92½	..	..
G. G. Marshman ..	Bencubbin ..	31	19	14	13	14	91	..	..
G. Barnes	Rance ..	29	18	13	13½	13	86½	..	..
K. Dodgshun.. ..	Ghurka ..	27	18½	14	13½	13	86	..	..

Aggregate Competition—Fallow and Crop.

50 acres of fallow 1940, and wheat crop grown thereon 1941.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	1940 Fallow Total.	Grand Total.
				Weeds.	Disease.				
Maximum points ..	—	35	20	15	15	15	100	100	200
C. E. Carra	Bencubbin..	33	19	13½	12	14	91½	90	181½
G. Barnes	Rance ..	29	18	13	13½	13	86½	89	175½

Soldiers' Section—50 Acres.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	1940 Fallow Total.	Grand Total.
				Weeds.	Disease.				
Maximum points ..	—	35	20	15	15	15	100	100	200
G. Barnes	Rance ..	29	18	13	13½	13	86½	89	175½
H. Gould	Bencubbin / Ghurka	21	17	13	14	13	78	87	165

Fallow Competition.

OPEN SECTION—50 ACRES.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum Points	25	25	25	25	100
G. J. Marshman	23	25	24	23	95
G. G. Marshman	24	23	23	23	93
G. Barnes	24	22	24	22	92
H. Gould	24	21	22	22	89

SOLDIERS' SECTION—50 ACRES.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum Points	25	25	25	25	100
K. Dodgshun	23	23	23	23	92
G. Barnes	24	22	24	22	92
H. Gould	24	21	22	22	89

Book Review

'Victorian Fungi," by James H. Willis, B.Sc.—(Published by the Field Naturalists' Club of Victoria.—Price, 2s. 6d.)

This booklet covers a large field in a small compass, and does so very efficiently. Popular descriptions of 120 of the gilled fungi (*Agaricaceae*) are given, and also notes on several interesting species of other classes, including the *Polyporaceae* (Pored Fungi), *Clavariaceae* (Coral Fungi), *Gasteromycetales* (puff-balls, &c.), and *Cordyceps* ("Vegetable caterpillars"). Very good features of the booklet are the three fine colour plates by the late M. I. Howie and the many excellent photographs and figures illustrating the text. A key is provided which has the virtue of compactness, but as is not uncommon in "keys" covering rather technical subjects prepared for the use of the layman, it suffers somewhat from lack of a clean-cut differentia in various places. There is no doubt, however, that *Victorian Fungi* is a very fine work which should prove of immense value to field naturalists, teachers of nature study, and all others in the community interested in the subject of the larger fungi.—G.W.

Potato Manurial Trials

Results for 1940-41

By G. H. MATTINGLEY, Potato Field Officer

Hilling up a crop of "Snowflakes" on the property of Messrs. Gooch Bros., Wheatsheaf.

THE 1940-41 potato season has been remarkable for its very heavy production of excellent quality tubers, and a marked absence of disease. Certainly, in the early part of the season, Irish Blight was the cause of losing up to 50 per cent. of some of the early crops in the Gippsland hill area, and at Koo-wee-rup grub damage threatened to be severe, but as both these troubles are influenced by weather conditions, the advent of wet and cold weather during March prevented further damage, and good yields of sound late-crop potatoes were harvested.

Because of the acute shortage of labour, coupled with the very low and unpayable prices offering up till the end of July, and the operation of the quota system since 2nd August, it seems inevitable that a fair proportion of the potato crop not included in the marketable quota will remain in the ground. Weed growth now appearing with milder weather will also hamper harvesting operations.

In so far as the manurial trials have been concerned, the season has been very satisfactory, as in most instances good yields of prime quality potatoes were obtained. In the case of Beech Forest, where the crop was affected by early blight, results were not equal to expectations.

It should be noted that in the following tables of results the cost of fertilizers is calculated to the nearest sixpence from prices ruling in January, 1941. These costs do not take into account freight or spreading of the manure, but because of the fact that some of the manurial dressings used may not be purchased ready mixed, it is assumed for the sake of uniformity that all fertilizers are purchased separately, and an allowance of 7½d. per cwt. is made for mixing.

It is desired at this juncture to place on record the appreciation of the Department of Agriculture of the co-operation and assistance given by farmers on whose properties these trials are conducted.

Fallowing for the next season's potato crop.

Coragulac—T. J. Carmody.

The Coragulac plot was sown on the 9th August, 1940, on an excellent piece of strong black volcanic soil, typical of the surrounding area. Previous to potatoes, two crops of onions had been taken off the paddock which had been out in grass for many years. During the growing season, weather conditions were fairly dry, and only light yields were obtained from early crops in the Western District. However, the plot proved to be one of the best crops in the district, and produced a nice sample of potatoes, clean and free of disease, averaging about 4 tons per acre.

As will be seen in Table I., the effect on yield of the various manurial treatments has been very slight, as has been the case each year at Coragulac. It has become increasingly evident that in normal seasons artificial manures are of no value for the early potato crop on this particular soil type. Table II. shows the average results for the four years the trials have been conducted, and although the dressing of superphosphate 3 cwt. + ammonium sulphate 1 cwt. shows an extra return of 11s. per acre, when freight and spreading costs are deducted no significant increment is obtained.

TABLE I.—POTATO MANURIAL TRIALS, CORAGULAC.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	3 15
Super., 2 cwt.	3 8
Super., 3 cwt.	3 17
Super., 4 cwt.	4 2
Super., 3 cwt. + amm. sulph., 1 cwt. ..	4 7
Super., 3 cwt. + amm. sulph., 2 cwt. ..	4 2

TABLE II.—AVERAGE RESULTS, CORAGULAC.

For Four Years, 1937-38 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per Ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 3	..	..	..	..
Super., 2 cwt.	4 2	..	..	0 10 0	..
Super., 3 cwt.	4 5	0 2	0 10 0	0 15 0	..
Super., 4 cwt.	4 6	0 3	0 15 0	1 0 0	..
Super., 3 cwt. + amm. sulph. 1 cwt.	4 12	0 9	2 5 0	1 14 0	0 11 0
Super., 3 cwt. + amm. sulph., 2 cwt.	4 7	0 4	1 0 0	2 11 6	..

Illowa—J. K. Sheen.

The trial at Illowa, in the far Western District, also is conducted on the early crop of potatoes. The soil here is a very friable, red volcanic loam, on the southern slopes of Tower Hill. The plot was sown on 6th August, 1940, on seven to eight-year-old grass land, the seed going in under the sod as is common practice in this district.

Because of the fairly dry growing period, slight and rather erratic response was made to the various manures (Table III.). However, the eight-year averages quoted in Table IV. show that economic increases in yield can be obtained by the use of artificial fertilizers, but that it matters little which of the heavier

dressings is used. The application of sulphate of ammonia does not seem to be justified, as the increase in yield obtained is not commensurate with the additional cost involved.

TABLE III.—POTATO MANURIAL TRIALS, ILLOWA.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	4 15
Super., 2 cwt.	5 7
Super., 3 cwt.	5 10
Super., 4 cwt.	4 15
Super., 3 cwt. + amm. sulph., 1 cwt. ..	5 15
Super., 3 cwt. + amm. sulph., 2 cwt. ..	6 17

TABLE IV.—AVERAGE RESULTS, ILLOWA.

For Eight Years, 1933-34 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 16	..	..	..	..
Super., 2 cwt.	5 6	0 10	2 10 0	0 10 0	2 0 0
Super., 3 cwt.	5 13	0 17	4 5 0	0 15 0	3 10 0
Super., 4 cwt.	5 14	0 18	4 10 0	1 0 0	3 10 0
Super., 3 cwt. + amm. sulph., 1 cwt.	5 18	1 2	5 10 0	1 14 0	3 16 0
Super., 3 cwt. + amm. sulph., 2 cwt.	6 0	1 4	6 0 0	2 11 6	3 8 6

proved necessary to the production of good crops of potatoes on this lighter type of soil.

TABLE V.—POTATO MANURIAL TRIALS, MILLBROOK.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	4 14
Super., 2 cwt.	5 0
Super., 3 cwt.	5 10
Super., 4 cwt.	5 10
Super., 3 cwt. + amm. sulph., 1 cwt. ..	6 14
Super., 3 cwt. + amm. sulph., 2 cwt. ..	6 10

TABLE VI.—AVERAGE RESULTS, MILLBROOK.

For Nine Years, 1932-33 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per Ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 5	..	..	..	..
Super., 2 cwt.	4 9	1 4	6 0 0	0 10 0	5 10 0
Super., 3 cwt.	4 16	1 11	7 15 0	0 15 0	7 0 0
Super., 4 cwt.	4 15	1 10	7 10 0	1 0 0	6 10 0
Super., 3 cwt. + amm. sulph., 1 cwt.	5 17	2 12	13 0 0	1 14 0	11 6 0
Super., 3 cwt. + amm. sulph., 2 cwt.	5 13	2 8	12 0 0	2 11 6	9 8 6

Superphosphate and ammonia "3:1," at the rate of 4 cwt. per acre, has consistently given best results, and shows an average return of £11 6s. per acre for its use.

Millbrook—P. J. Ryan.

Weather conditions favoured the development of the late crop of potatoes in the central highlands, and although this plot is situated on light red volcanic soil on the fringe of the main potato-growing area, reasonably good results were obtained. Response to the manures was marked and regular (Table V.), and followed more or less on the lines of previous years.

The average returns for eight years (Table VI.) demonstrate the good response made to each dressing of artificial fertilizer, which has

Planting potatoes at Musk.

Left.—Selected, imported seed—virus infection negligible. Right.—Unselected, home-grown seed—virus infection approximately 99 per cent.

Musk—Bull Bros.

Sown on 19th November, 1940, and harvested on 11th June, 1941, the plots at Musk this season again showed very little response to superphosphate alone (Table VII.), but those sections treated with sulphate of ammonia showed a favorable reaction to this fertilizer. The average results shown in Table VIII. indicate that for a nine-year period sulphate of ammonia has given an economic increase in yield when mixed with 3 cwt. of superphosphate per acre. Best results have been obtained by adding to the superphosphate 2 cwt. of sulphate of ammonia, although the standard "3:1" superphosphate and ammonia mixture gives very good returns.

TABLE VII.—POTATO MANURIAL TRIALS, MUSK.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	5 8
Super., 2 cwt.	5 9
Super., 3 cwt.	5 5
Super., 4 cwt.	5 16
Super., 3 cwt. + amm. sulph., 1 cwt. ..	7 14
Super., 3 cwt. + amm. sulph., 2 cwt. ..	8 4

TABLE VIII.—AVERAGE RESULTS, MUSK.

For Nine Years, 1932-33 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 12	..	..	..	..
Super., 2 cwt.	4 9	0 17	4 5 0	0 10 0	3 15 0
Super., 3 cwt.	4 14	1 2	5 10 0	0 15 0	4 15 0
Super., 4 cwt.	4 16	1 4	6 0 0	1 0 0	5 0 0
Super., 3 cwt. + amm. sulph., 1 cwt.	5 11	1 19	9 15 0	1 14 0	8 1 0
Super., 3 cwt. + amm. sulph., 2 cwt.	6 2	2 10	12 10 0	2 11 6	9 18 6

Romsey—Spring Bros.

The Romsey plots were sown on 12th November, 1940, on some typical buckshot, red volcanic soil. Heavy rain in January, followed by moist cool weather, kept the tubers developing during the season, with the result that a good yield of large, well-shaped potatoes was obtained. As Table IX. shows, artificial manures had very little effect on the yields of the various plots, although those treated with sulphate of ammonia were conspicuous during the season for their heavier and darker green foliage.

Average results for nine years (Table X.) show that the optimum application of superphosphate alone is 3 cwt. per acre, as an extra 1 cwt. produces a decrease. Sulphate of ammonia, too, may be added only at the rate of 1 cwt. per acre, as heavier applications are unpayable.

While the results are less spectacular than in other cases, they show that a dressing of 4 cwt. per acre of the superphosphate and ammonia " 3 : 1 " mixture gives definite and satisfactory increases in yield.

A crop of Late Carman potatoes, Musk.

TABLE IX.—POTATO MANURIAL TRIALS, ROMSEY.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	5 17
Super., 2 cwt.	6 8
Super., 3 cwt.	6 5
Super., 4 cwt.	6 6
Super., 3 cwt. + amm. sulph., 1 cwt. ..	6 3
Super., 3 cwt. + amm. sulph., 2 cwt. ..	6 9

TABLE X.—AVERAGE RESULTS, ROMSEY.

For Nine Years, 1932-33 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per Ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 15	..	..	..	..
Super., 2 cwt.	5 5	0 10	2 10 0	0 10 0	2 0 0
Super., 3 cwt.	5 8	0 13	3 5 0	0 15 0	2 10 0
Super., 4 cwt.	5 5	0 10	2 10 0	1 0 0	1 10 0
Super., 3 cwt. + amm. sulph., 1 cwt.	5 17	1 2	5 10 0	1 14 0	3 16 0
Super., 3 cwt. + amm. sulph., 2 cwt.	6 0	1 5	6 5 0	2 11 6	3 14 6

Trentham—Toomey Bros.

The paddock in which these plots were sown on 20th November, 1940, had been in grass for about ten years, and was broken up in May, 1940, for black oats for feed. In September the residue of this crop was turned under, and the land prepared for potatoes. Soil conditions at sowing time were excellent, and as seasonal conditions proved most favorable very heavy yields were obtained (Table XI.).

Average results (Table XII.) show that while superphosphate alone provides a certain increase in yield, best results are obtained by applying superphosphate 3 cwt. + ammonium sulphate 2 cwt. per acre to the crop, as this results in nearly doubling the yield received without manure.

TABLE XI.—POTATO MANURIAL TRIALS, TRENTHAM.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	8 12
Super., 2 cwt.	10 12
Super., 3 cwt.	10 17
Super., 4 cwt.	11 2
Super., 3 cwt. + amm. sulph., 1 cwt. ..	12 1
Super., 3 cwt. + amm. sulph., 2 cwt. ..	11 5

TABLE XII.—AVERAGE RESULTS, TRENTHAM.

For Nine Years, 1932-33 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 13	..	..	..	..
Super., 2 cwt.	4 12	0 19	4 15 0	0 10 0	4 5 0
Super., 3 cwt.	5 6	1 13	8 5 0	0 15 0	7 10 0
Super., 4 cwt.	5 7	1 14	8 10 0	1 0 0	7 10 0
Super., 3 cwt. + a m m. sulph., 1 cwt.	6 4	2 11	12 15 0	1 14 0	11 1 0
Super., 3 cwt. + a m m. sulph., 2 cwt.	6 17	3 4	16 0 0	2 11 6	13 8 6

TABLE XIII.—POTATO MANURIAL TRIALS, WHEATSHEAF.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	5 7
Super., 2 cwt.	5 5
Super., 3 cwt.	5 7
Super., 4 cwt.	5 7
Super., 3 cwt. + amm. sulph., 1 cwt. ..	6 5
Super., 3 cwt. + amm. sulph., 2 cwt. ..	7 2

Wheatsheaf—Gooch Bros.

No variation in yield was observed at Wheatsheaf in plots treated with superphosphate alone. Sulphate of ammonia provided a small but significant increase, and its capacity to do this regularly is shown in Table XIV. where average results over nine years are set out. The standard application of superphosphate and ammonia "3:1" gives an increase of 1 ton 16 cwt. per acre over no manure, and if the potatoes are valued at £5 per ton, this means an extra return per acre of £7 6s. after the cost of the fertilizer is deducted.

TABLE XIV.—AVERAGE RESULTS, WHEATSHEAF.

For Nine Years, 1932-33 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per Ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 0	..	..	..	..
Super., 2 cwt.	4 9	0 9	2 5 0	0 10 0	1 15 0
Super., 3 cwt.	4 15	0 15	3 15 0	0 15 0	3 0 0
Super., 4 cwt.	4 17	0 17	4 5 0	1 0 0	3 5 0
Super., 3 cwt. + a m m. sulph., 1 cwt.	5 16	1 16	9 0 0	1 14 0	7 6 0
Super., 3 cwt. + a m m. sulph., 2 cwt.	5 19	1 19	9 15 0	2 11 6	7 3 6

Typical potato-growing country in the Neerim district.

Beech Forest—Jos. Knox.

At the request of the Beech Forest and Otway Produce Society, the Beech Forest trials, which have in the past been conducted with the Late Carman variety, were shifted to a new location where the Up-to-date variety will be used. In order to complete a ten-year period with Late Carman, the plot this season was divided into two sections, one being devoted to each variety. The yields obtained are set out in Table XV., and because of the occurrence in the crop of patches of early blight in the foliage, the returns were somewhat irregular.

Table XVI. shows average results on the Late Carman variety over a period of ten years. Any manurial treatment provides substantial increases in yield, but a heavy rating of superphosphate plus ammonia gives best results. The addition of sulphate of potash is unnecessary, as it does not influence the yield in any way.

TABLE XV.—POTATO MANURIAL TRIALS, BEECH FOREST.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.	
	Late Carman	Up-to-Date
	T. C.	T. C.
No manure	2 18	3 1
Super., 6 cwt.	7 7	7 7
Super., 6 cwt. + amm. sulph., 1 cwt.	8 9	6 18
Super., 6 cwt. + amm. sulph., 2 cwt.	9 19	9 11
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	8 3	9 8
Super., 9 cwt.	6 16	7 7
Super., 9 cwt. + amm. sulph., 1 cwt.	6 10	9 11
Super., 9 cwt. + amm. sulph., 2 cwt.	5 5	9 8

TABLE XVI.—AVERAGE RESULTS, BEECH FOREST.

For Ten Years, 1931-32 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 9	..	..	..	..
Super., 6 cwt.	5 10	2 1	10 5 0	1 10 0	8 15 0
Super., 6 cwt. + a m m. sulph., 1 cwt.	7 5	3 16	19 0 0	2 11 0	16 9 0
Super., 6 cwt. + a m m. sulph., 2 cwt.	7 15	4 6	21 10 0	3 8 6	18 1 6
Super., 6 cwt. + a m m. sulph., 1 cwt. + p o t. sulph., 1 cwt.	7 4	3 15	18 15 0	3 11 0	15 4 0
Super., 9 cwt.	5 18	2 9	12 5 0	2 5 0	10 0 0
Super., 9 cwt. + a m m. sulph., 1 cwt.	7 5	3 16	19 0 0	3 7 6	15 12 6
Super., 9 cwt. + a m m. sulph., 2 cwt.	7 17	4 8	22 0 0	4 5 0	17 15 0

Neerim—J. Halvy.

Although the Neerim trials have been in operation for the last four years only, one fact has become evident in that period. Unlike the remainder of the potato-growing soils in Victoria, the addition of sulphate of ammonia to the basic rating of superphosphate has no beneficial effect on yield at Neerim. However, if 1 cwt. of sulphate of potash is added to the superphosphate a good response is seen in the crop, and over the four-year period (Table XVIII.) an average increase of 18 cwt. per acre over superphosphate 6 cwt. alone has been obtained by the addition of sulphate of potash. At £5 per ton this increase is valued at £4 10s., and the cost of the 1 cwt. of sulphate of potash is 19s. 6d.

TABLE XVII.—POTATO MANURIAL TRIALS, NEERIM.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	7 1
Super., 4½ cwt.	7 13
Super., 6 cwt.	8 7
Super., 6 cwt. + pot. sulph., 1 cwt. ..	9 8
Super., 6 cwt. + amm. sulph., 1 cwt. ..	7 6
Super., 6 cwt. + amm. sulph., 2 cwt. ..	7 4
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	9 15

TABLE XVIII.—AVERAGE RESULTS, NEERIM.

For Four Years, 1937-38 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per Ton.	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	5 13	..	..	..	..
Super., 4½ cwt.	7 4	1 11	7 15 0	1 2 6	6 12 6
Super., 6 cwt.	7 14	2 1	10 5 0	1 10 0	8 15 0
Super., 6 cwt. + p o t. sulph., 1 cwt.	8 12	2 19	14 15 0	2 14 0	12 1 0
Super., 6 cwt. + a m m. sulph., 1 cwt.	6 18	1 5	6 5 0	2 11 0	3 14 0
Super., 6 cwt. + a m m. sulph., 2 cwt.	7 17	2 4	11 0 0	3 8 6	7 11 6
Super., 6 cwt. + a m m. sulph., 1 cwt. + p o t. sulph., 1 cwt.	9 3	3 10	17 10 0	3 11 0	13 19 0

Toombullup—G. R. Stubbs.

Results from Toombullup this season were somewhat affected by the dense growth of fat-hen after heavy rains in January. Because of the short time these trials have been conducted, no definite conclusions may be drawn, except that, for best results, sulphate of ammonia needs to be added to the basic rating of superphosphate. Average results for four years are given in Table XX.

TABLE XIX.—POTATO MANURIAL TRIALS, TOOMBULLUP.

1940-41.

Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	5 4
Super., 3 cwt.	4 13
Super., 3 cwt. + pot. sulph., 1 cwt. ..	4 10
Super., 3 cwt. + amm. sulph., 1 cwt. ..	6 1
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	6 8
Super., 6 cwt.	5 4
Super., 6 cwt. + pot. sulph., 1 cwt. ..	5 16
Super., 6 cwt. + amm. sulph., 1 cwt. ..	6 8
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	5 11

TABLE XX.—AVERAGE RESULTS, TOOMBULLUP.

For Four Years, 1937-38 *to* 1940-41.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £5 per ton	Cost of Manure per Acre.	Extra Return per Acre due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 5	..	..	..	..
Super., 3 cwt.	3 11	0 6	1 10 0	0 15 0	0 15 0
Super., 3 cwt. + pot. sulph., 1 cwt.	3 6	0 1	0 5 0	1 17 0	..
Super., 3 cwt. + amm. sulph., 1 cwt.	4 11	1 6	6 10 0	1 14 0	4 16 0
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 15	1 10	7 10 0	2 14 0	4 16 0
Super., 6 cwt.	3 18	0 13	3 5 0	1 10 0	1 15 0
Super., 6 cwt. + pot. sulph., 1 cwt.	4 2	0 17	4 5 0	2 14 0	1 11 0
Super., 6 cwt. + amm. sulph., 1 cwt.	4 18	1 13	8 5 0	2 11 0	5 14 0
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 16	1 11	7 15 0	3 11 0	4 4 0

Clarke's Hill—Labbett Bros.

Plots at Clarke's Hill were established only last season. They are situated on some of the best heavy chocolate soil in the Ballarat district, and results from them should be a valuable criterion for similar soils in the district. Table XXI. sets out the results obtained for the season 1940-41.

TABLE XXI.—POTATO MANURIAL TRIALS, CLARKE'S HILL.

1940-41.

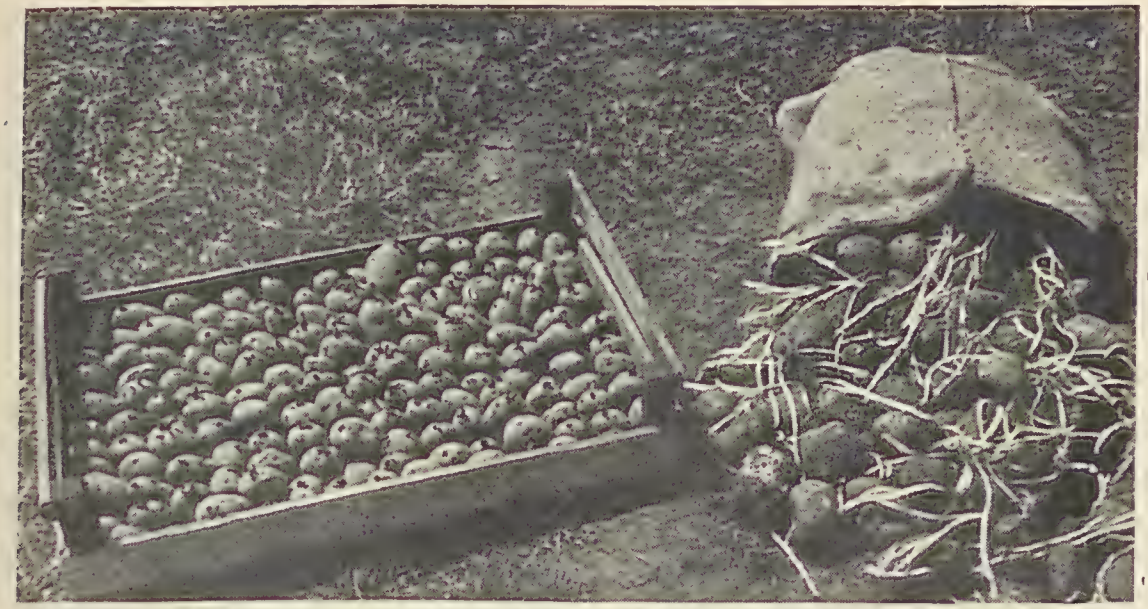
Manure per Acre.	Yield Marketable Tubers per Acre.
	T. C.
No manure	7 6
Super., 3 cwt.	7 14
Super., 1½ cwt. + amm. sulph., ½ cwt. ..	8 6
Super., 3 cwt. + amm. sulph., 1 cwt. ..	8 4
Super., 3 cwt. + amm. sulph., 2 cwt. ..	9 5
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	8 19

MISCELLANEOUS TRIALS, MILLBROOK.

At the main potato experimental plots at Millbrook, various other tests besides manurial are carried out on different aspects of potato culture. Each year a field day is held on these plots, and visiting farmers show keen interest in the behaviour of the potato crop under the various conditions imposed by the trials. Varieties of potatoes new to Victoria are tested here also, and if they prove of value, will be distributed to interested growers.

Dipping Tests.

Potato seed is dipped in fungicidal solutions prior to planting, in order to control the various surface scab diseases, such as rhizoctonia. A number of preparations for this purpose is on the market, and their efficiency under field conditions in controlling these diseases is investigated. That dipping pays is shown by the fact that every preparation has the indirect effect of increasing yield, while the "formalin" treatment, which has been



Boxed v. bagged potato seed at Millbrook, showing the effect of these two storage methods.

under test for the longest period, gives, on the average, a 67 per cent. increase in yield over untreated seed.

Dipping Tests.

Treatment.	1940-41 Yield per Acre.	Average Results for 11 Years.	
		Average Yield.	Percentage Increase.
	T. C.	T. C.	
Seed untreated ..	2 10	3 10	..
Dipped Formalin, 1 lb.–20 gallons water ..	3 10	5 17	67
Acidulated Corrosive Sublimate	4 10	..	..
Aretan	4 0	..	..

Storage Test.

The present method of potato seed storage advocated by the Department of Agriculture was introduced to Victoria by Mr. J. T. Ramsay, potato expert of the Department. This method—the storage of seed in specially constructed trays—has proved to be economical and more convenient than any other method in which the seed is exposed to sunlight. By storing in this manner, a quicker and more even strike is obtained, and the sets are more able to withstand adverse conditions at planting time.

Compared with seed stored in bags, boxed seed, over a period of fourteen years, gives an average increase in yield of 74 per cent.

Storage Test.

Seed Used.	1940-41 Yield per Acre.	Average Results for 14 Years.	
		Average Yield.	Percentage Increase.
	T. C.	T. C.	
Bagged	3 0	3 6	..
Boxed	4 10	5 15	74

Cultivation Tests.

The purpose of this trial is to demonstrate that the potato crop benefits from inter-row cultivation, which conserves soil moisture, kills weeds, and permits freer root movement and better tuber development. The final cultivation or moulding is of very great value in the control of the grub of the potato moth.

The table of results given on the next page shows that for the fifteen-year period, each additional cultivation, after the first, results in an average increase in yield of approximately 17 cwt. per acre.

CULTIVATION TESTS.

Treatment.	1940–41 Yield per Acre.	Average Results for 15 Years.	
		Average Yield.	Percentage Increase.
	T. C.	T. C.	
One cultivation ..	4 0	4 9	..
Two cultivations ..	4 0	5 6	19
Three cultivations ..	4 0	6 2	37

Maturity Tests.

The maturity test was not carried out at Millbrook last season, because in the previous year the whole crop was cut down by frost in March, and all seed was immature.

The value of immature seed probably lies in the fact that seed so harvested is obtained before late season virus infections have had time to reach the tubers. Immature seed has consistently given an average of over 1 ton per acre better yield than ripe seed.

MATURITY TESTS.

Seed Used.	Average Results for 12 Years.	
	Average Yield.	Percentage Increase.
	T. C.	
Ripe	5 7	..
Immature	6 10	21

Selection Tests.

Selected seed is taken from plants that during the season have been selected as being apparently free from virus or other diseases. Only seed from those plants giving a better than average yield is retained. The "selected" seed used in this trial last year has been subjected to this rigorous selection for five years, and proved to have a higher yielding capacity than a line of "certified" seed obtained from another district. The "ordinary" seed used was purchased at random from a local grower who does not practise field selection. This seed proved to be 88 per cent. virus infected, as against less than 2 per cent. in the selected seed.

Field selection is the only way in which a healthy stand true to type may be obtained and retained for any period of time. The extra yield produced by selected seed should be sufficient inducement for more growers to practise field selection in their own crops.

SELECTION TESTS.

Seed Used.	1940–41 Yield per Acre.	Average Results for 15 Years.	
		Average Yield.	Percentage Increase.
	T. C.	T. C.	
"Ordinary" (not selected)	2 4	5 1	..
Selected	6 0	6 11	30
Certified	5 14	..	..

The 1940-41 varietal tests at Millbrook, which were conducted under identical soil and manurial conditions, resulted as follow:—

VARIETY TRIALS.

	Variety.	Yield.
		T. C.
L	Snowflake	6 14
L	Late Carman	6 0
L	King Edward	4 10
M	Up-to-Date	4 10
M	Abundance	2 10
M	Katahdin	3 0
E	Delaware	4 0
M	Jersey Kidney	3 0
E	Pink Eye	3 6
L	White Monarch	5 6
E	Catriona	2 0
E	Bismarck	5 0
L	President	3 0
L	Brownell	4 0

E. Early; M. Midseason; L. Late.

Field day at the Millbrook potato trials, February, 1940.

Potato Manurial Trials.—Victoria.

Average Returns.

Location.	Soil.	Average Rainfall.	Period of Trials.	Average Yield No Manure.	Average Yield Super. and Ammonia.	Percentage Increase Super. and Ammonia over No Manure.
		inches	years	T. C.	T. C.	per cent.
Western—						
Illowa	Red Volcanic ..	28	8	4 16	5 10 (4 cwt. per acre) ..	15
Koroit	Black Volcanic ..	30	8	5 13	7 1 (4 cwt. per acre) ..	25
Coragulac ..	Black Volcanic ..	25	4	4 3	4 12 (4 cwt. per acre) ..	11
Beech Forest ..	Clay Loam ..	60	10	3 9	7 5 (7 cwt. per acre) ..	110
Central—						
Millbrook ..	Red Volcanic ..	35	8	3 5	5 17 (4 cwt. per acre) ..	80
Musk	Red Volcanic ..	45	9	3 12	5 11 (4 cwt. per acre) ..	54
Romsey ..	Red Volcanic ..	28	9	4 15	5 17 (4 cwt. per acre) ..	23
Trentham ..	Red Volcanic ..	45	9	3 13	6 4 (4 cwt. per acre) ..	70
Wheatsheaf ..	Red Volcanic ..	40	9	4 0	5 16 (4 cwt. per acre) ..	45
Clarke's Hill ..	Red Volcanic ..	30	1	7 6	8 4 (4 cwt. per acre) ..	12
North-east—						
Toombullup ..	Clay Loam ..	40	4	3 5	4 18 (7 cwt. super. and ammonia)	50
Gippsland—						
Catani	Swamp Land ..	35	6	2 7	5 6 (7 cwt. per acre) ..	147
Childers ..	Clay Loam ..	40	10	2 6	5 17 (7 cwt. per acre) ..	154
Fish Creek ..	Clay Loam ..	50	9	4 17	9 6 (7 cwt. per acre) ..	92
Korumburra ..	Clay Loam ..	45	5	5 2	10 12 (7 cwt. per acre) ..	107
Neerim	Clay Loam ..	40	4	5 13	8 12 (7 cwt. super. and potash)	..
Warragul ..	Clay Loam ..	35	11	4 7	8 7 (7 cwt. super. and potash)	92

Potato Stabilization Plan

Report of the Victorian Committee

THE year 1941 was a record one for potato production in Victoria, and the figures given in the following table permit a comparison to be made between acreage and production for that year and the preceding nine years:—

Year.	Acreage.	Tonnage.
1931–32	69,929	206,489
1932–33	69,783	182,471
1933–34	60,856	142,132
1934–35	54,214	109,329
1935–36	44,287	104,125
1936–37	45,627	196,623
1937–38	41,105	134,712
1938–39	34,396	81,415
1939–40	32,177	87,931
1940–41*	43,500	257,000

* The actual tonnage for 1940–41 is not yet available. According to crops dug, the average yield appears to have been approximately 6 tons per acre, and the total yield is estimated from that figure.

According to inquiries made by the Commonwealth authorities, it was estimated that the annual consumption of potatoes in Victoria was 120,000 tons (2,000 tons per week), plus some 20,000 tons used for seed purposes. In a year of normal production some 20,000 tons are exported to other States.

The problem facing growers was not so much the sale of Victoria's normal supply, but to obtain a payable price. It was recognized early in the year that if growers placed their potatoes on the market without regulating quantities, prices would be below cost of production; this is what actually happened during the middle of the year.

In June and July potatoes were selling at 25s. to 40s. per ton at country railway stations. The cost of secondhand bags was up to 8s. per dozen (fifteen bags are used for each ton of potatoes); cartage from the farm to rail stations was 3s. per ton; digging varied from 15s. to 30s. per ton; selling commission is 5 per cent. On top of these charges is the cost of production, including seed (½ ton per acre), which would average about £3 to £4 per ton, according to circumstances.

From these figures it will be seen that the average grower would experience considerable loss in marketing his product unless some action were taken to regulate the weekly supply and bring about an increased price.

In February of last year a conference of interstate growers and others interested in the potato industry was convened in Melbourne and presided over by the Commonwealth Prices Commissioner (Professor D. B. Copland). Conference considered plans to stabilize the Australian potato market, but no finality was reached. A further conference was held in Melbourne early in June, when a general agreement was arrived at for a stabilization plan for the three States, New South Wales, Victoria, and Tasmania. At a later date Tasmania withdrew, and the interstate plan was abandoned. Rather than see growers suffer ruinous losses, the Victorian Government decided to institute a plan for this State only.

When consideration was first given to a stabilization plan, it was generally recognized that the full crop of potatoes could not be sold even at a low price. The object, therefore, was to obtain at least a reasonable stabilized price for the quantity of No. 1 grade potatoes consumed in Victoria and, if possible, to bring about an increase for the sale of Victorian potatoes outside the State.

A difficult problem to decide was how the surplus could best be eliminated from the market. The Department of Agriculture did a considerable amount of preliminary work on the subject, and at one period it was thought that by preventing the sale of certain sizes—the very large and the small, and also No. 2 grade—the difficulty would be largely overcome. To test this, two bags of potatoes were obtained from each of the potato districts, and each individual potato was weighed with the results set out in the accompanying table.

POTATOES—GRADE PERCENTAGES (WEIGHT BASIS) IN DISTRICTS SAMPLED.

Grade.	Mornington.	Buln Buln.	Central.	Western.	Otway-Alvie.	Gembrook.	Kinglake.	Weighted Mean of Districts.
	%	%	%	%	%	%	%	%
3 oz. to 14 oz. (inc.) ..	80·1	79·4	73·7	69·8	72·1	79·3	81·5	75·6
Over 14 oz. and up to 16 oz. ..	7·0	6·7	8·2	6·9	8·0	5·0	5·6	7·4
„ 16 „ „ 18 „ ..	4·1	4·8	6·2	6·7	6·1	6·1	4·2	5·6
„ 18 „ „ 20 „ ..	2·5	3·7	3·8	4·9	1·8	3·4	2·6	3·5
„ 20 „ „ 22 „ ..	2·0	2·0	2·8	5·5	6·5	·9	1·4	2·9
„ 22 „ „ 24 „ ..	1·6	2·0	1·9	3·1	2·2	1·5	1·1	2·0
„ 24 „ „ 26 „ ..	1·2	·5	1·2	·6	1·2	·6	2·9	1·1
„ 26 „ „ 28 „ ..	·5	·5	·9	1·0	..	·6	..	·7
„ 28 „ „ 30 „ ..	·6	·2	·5	·7	1·4	·6	·7	·6
Over 30 oz.	·4	·2	·8	·8	·7	2·0	..	·6
	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

From these figures it can be seen that 75 per cent. of the potatoes weighed were of table size, i.e., 3 oz. to 14 oz., and the elimination of certain sizes was not a practical solution of the problem.

The only legislation in operation to bring about a stabilization plan was the National Security (Emergency Powers) Acts. Draft regulations were submitted for consideration to the Victorian State War Advisory Council, consisting of the Premier (Mr. Dunstan), the Minister of Lands (Mr. Lind), the Minister of Education (Sir John Harris); Messrs. Hollway, Maltby, and Macfarlan—representing the United Australia party; Messrs. Cain and Cremean—representing the Labour party; and Mr. Eager—representing the Legislative Council. The War Advisory Council having agreed to the draft, its decision was approved by the Victorian Government and the Regulations were gazetted on the 29th of July, 1941.

These Regulations prohibited the sale after the 2nd of August, 1941, of potatoes for human consumption in Victoria other than in or from bags sealed in a manner approved of by the Director of Agriculture, and appointed a committee, known as the Victorian Potato Committee to administer the provision of these Regulations.

The committee consisted of the following members:—J. M. Ward (representing the Victorian Government), Chairman; W. W. Chapman and A. C. Boustead (representing potato growers); J. F. Noonan and H. G. Tinney (representing potato merchants); E. K. Ahern (representing consumers of potatoes).

Without the co-operation of the Commonwealth Government, the Potato Marketing Plan would not have been practicable. The Commonwealth Prices Commissioner issued a Prices Regulation Order fixing the maximum price of potatoes sold for human consumption in Victoria at 10s. per ton, f.o.r. Melbourne, unless such potatoes had affixed thereto the seal of the Department of Agriculture, when they could be sold at a maximum price of £6 per ton, f.o.r. Melbourne, for No. 1 grade (later raised to £6 10s. per ton for No. 1 grade Carman potatoes).

It was then the duty of the Victorian Potato Committee to regulate the supply of potatoes on to the Victorian market, in order to maintain the fixed maximum price.

It was decided to prohibit the sale for human consumption in Victoria of potatoes other than the No. 1 grade standard as prescribed under the Regulations of the Fruit and Vegetables Act, and, in order to prevent the illegal sale of potatoes in bags other than those sealed in accordance with the Regulations, the committee prohibited any person (other than growers) having in his possession seed or stock food potatoes of a quantity in excess of 14 lb. without its approval.

At the outset many administrative problems confronted the committee in administering the Regulations.

No definite information was available as to the quantity of potatoes held by each grower, but as a preliminary basis the committee had before it information obtained from growers by the Potato Inspectors of the Department of Agriculture.

The committee decided to issue quotas to growers determining the quantity of potatoes that they could market from time to time for human consumption in Victoria, and the quotas issued during the first two or three weeks of operation of the plan were based on the preliminary information obtained from inspectors.

In accordance with the Regulations, growers were required to lodge certain particulars of their crops, and the quotas issued were, later, based on these returns.

There was no power to fix a minimum price, and to attain and reasonably maintain the maximum price it was essential that the committee regulate the supply in accordance with the demand which, as already stated, was considered to be 2,000 tons per week, and quotas were allotted to growers accordingly, based on 40 per cent. of the crop of No. 1 grade potatoes unsold on the 21st of July, 1941. At this period, quotas had to be allotted to approximately 3,000 growers, and it was impracticable to give every grower a quota each week, and naturally enough no growers could receive a large quantity at any one time, and this caused a considerable amount of discontent among the farmers. So far as the committee was concerned, unrestricted sales could take place on potatoes sold for interstate trade, for overseas, for seed, or for processing purposes.

The committee was not a Marketing Board, and therefore did not buy, acquire, sell, or market potatoes in any form. It merely regulated the quantity placed upon the market and when growers received a quota they marketed such quotas in any manner they desired.

Owing to the special conditions governing the production and marketing of "spring" or "new" potatoes, the Regulations in respect to "sealing" and the issuing of quotas were not enforced for such potatoes.

A few weeks after the plan became operative, it was evident that the estimated consumption of 2,000 tons per week was too high; the actual consumption was not more than 1,700 tons per week, and under the circumstances the committee was unable to grant quotas for the 40 per cent. as originally intended. Quotas were issued to growers in order to return them for their potatoes an average price of £5 per ton at country railway stations against the average price of 37s. 6d. per ton prior to the plan coming into operation.

Anyone who pauses to think will readily realize that without regulating the supply, a continual glut of potatoes at low prices would have resulted.

Although a considerable amount of "bootlegging" was anticipated, it was not very much in evidence. This has been proved by the policing of the plan throughout the State, and many of the rumours circulated were without foundation.

The quotas issued to growers under the plan amounted to 30,600 tons, which total was sold at approximately £5 per ton at country centres. Potatoes shipped to other States during 1941 amounted to 32,522 tons, compared with an average of 20,307 tons per year over the past five years; shipped overseas, 4,212 tons, compared with an average of 527 tons per year for the past five years.

The potato growers, on the sale of their potatoes under the plan, received an additional sum of approximately £100,000 at no extra cost to the grower, and the consumers were able to purchase potatoes retail at 1d. per lb.

The committee would like to place on record its appreciation of the excellent services rendered by the Minister of Agriculture, Hon. E. J. Hogan, M.L.A., and the staff of the Department of Agriculture; the Commonwealth Prices Commissioner (Professor D. B. Copland); the Victorian Deputy Prices Commissioner (Mr. H. E. Bishop), and their respective staffs, who, at all times, were of great help in making the plan a success.

Journal of Agriculture, Index for 1941

Owing to the need for conserving paper supplies, due to the war, the Index of the *Journal of Agriculture* for 1941 will not be posted with each copy of the February issue of the Journal, as was done in former years. Copies of the Index, however, may be obtained, post free, on application to the Stores Branch, Department of Agriculture, Melbourne, C.2.

IN THE GARDEN

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

The Care of Lawns.

THE dry spell and hot weather in late December and early January caused many lawns to show brown patches in spite of careful watering. Where watering was neglected, or inadequate, the brown patches of course were much larger. Some of these patches were caused by the hot, dry weather killing the annual grasses to be found in most lawns, but others were due to inadequate water penetration because of hard patches of soil, slight undulations in the surface, or to slopes—all of which tend to shed the water. These areas should be forked to permit water penetration. This operation consists of jabbing the fork vertically into the lawn and then levering slightly until the top 3 or 4 inches of the lawn and underlying soil is opened a little. The forkings should be about 6 or 8 inches apart. If a light fertilizer application is given, it will hasten the recovery. Sulphate of ammonia, at the rate of half to one ounce per square yard, is a useful dressing. Much interesting information on the maintenance of lawns is contained in a pamphlet, entitled "Lawns and Playing Grounds," which is obtainable free on application to the Director of Agriculture, Department of Agriculture, Treasury Gardens, Melbourne, C.2.

The Dahlia.

Dahlias.

Dahlias will require liberal manuring and watering this month in order to produce strong growth and prolific blooms. If not already mulched, the soil should be covered with stable manure, lawn clippings, &c., as early as possible. February is usually a hot month, and this mulching will reduce the temperature of the surface soil and assist in conserving moisture. Weak liquid manure may be applied every fortnight. If long stems and large blooms are required, disbudding must be carried out regularly, but in most gardens where a colourful display is desired, there is no necessity to disbud.

Roses.

Roses should now be lightly pruned or trimmed to remove faded flowers and weak twiggy growth. This pruning should be very light, and shoots should be cut back only hard enough to retain well developed buds facing in the desired directions, so that growths will form a well-balanced effect. Apply a light dressing of a mixture made of two parts of blood and bone and one part of superphosphate. Lightly fork this manure into the soil and cover with a mulch of stable or cow manure. Water thoroughly, but avoid watering over the foliage as much as possible.

Annuals.

Seeds of annuals mentioned in these notes for January can still be sown for winter and spring flowers. A light sprinkling of sandy soil, together with a light covering of sifted manure, should be placed over the seeds. Shading will be necessary. This can be provided by light prunings from shrubs or trees in the garden, or by blinds made of hessian. Seeds of primula, viola, larkspur, early-flowering sweet pea, cineraria, godetia, and aquilegia may be sown. Good bedding effects will also be obtained in the spring if seeds of ranunculus and anemone are sown now. The seedlings

from this sowing will bloom early in the spring. The "Claremont" strains of these two flowers have been popular for many years, and are a distinct improvement of the former bedding types. They contain some of the best and brightest colours and are very free-flowering.

It is not possible to produce large exhibition blooms of pansies unless the gardener obtains the correct varieties and strains, and pays very careful attention to all cultural problems. Englemann's Exhibition strain is one of the most popular, and Roggli's Giants also have won favour in the garden, although they are not the true exhibition type.

VEGETABLE GROWING.

Interest in vegetable growing has been stimulated by prospects of a scarcity of vegetables and high prices to the consumer. Seeds of some kinds of vegetables are becoming more difficult to obtain, and where possible, both home and market gardeners are urged to select good plants and save their own seed.

For winter vegetables, sowings of swede, carrot, turnip, and beet seed should be made at once. These seeds are sown thinly in rows, and when the plants are large enough they are thinned out. Seed of other vegetables, such as celery, cauliflowers, Brussel sprouts, and cabbage are sown in seed beds in a sheltered position, and planted out when the second leaf has appeared.

Watering and cultivation must be carefully and constantly carried out. Weeds grow very fast at this time of the year, and they are most easily destroyed by hoeing when quite small. Do the hoeing in the morning, if possible, so that the sun and the drying out of the disturbed surface soil will kill the small weeds. If the soil is fairly dry on the surface before hoeing, results will be better than if it is wet. Wet soil clings to the roots of the weeds, even after they have been disturbed, and enables some of them to survive. Leave the surface rough to encourage water penetration.

The Control of Ants

Ants are primarily household pests although occasionally they also may be pests of agriculture or industry. They should not be confused with "white ants," otherwise known as "termites."

When endeavouring to destroy ants, it should be remembered that the queen is the only egg-laying form in the nest and if she can be destroyed the nest eventually will die out, whereas if the workers only (the form most commonly seen) are destroyed the nest can still continue:—

There are two ways of destroying the queen or queens, namely:—

(1) *By direct action against the nest,* usually by means of chemicals injected into it. Carbon bisulphide is one of the best materials for this purpose. An opening is made into the nest by means of a stick and a few ounces of the carbon bisulphide are poured in. Wet bags then should be placed over the top. Great care should be taken in handling carbon bisulphide as it is inflammable and poisonous. For this reason petrol, which is fairly effective, frequently is used instead. This method is especially applicable to the large mound or meat ants which are more common in country than city areas.

(2) *By the use of poison baits.*—Most of these are liquid and sweet with a small amount of poison so that the workers can take some of the poisoned material to the queen before they themselves die. The most complicated mixture is used for the Argentine ant, and persons troubled by this pest should make application to the Biological Branch of the Department of Agriculture for the correct formula. For the common black ant, a simple mixture of honey (1 lb.), water (3 oz.), and arsenite of soda (16 gr.) is effective. It can be stored and used in small quantities when ants invade the house.

Solid baits also are used particularly for seed-harvesting ants, which infest and damage lawns. By mixing 50 parts by weight of flour to 1 part of Paris Green and scattering over the lawn at the rate of 12 oz. to 100 sq. ft., good control can be obtained.

By RACHEL M. PEILE and MARY D. WHITE, Fruit Preserving Experts

Fruit is always welcome in the home, especially where there are children. In the flush of the fruit season, it is an easy matter to buy a pound or two of pears, apricots or peaches, but during the winter months housewives have a greatly reduced choice, consisting of cool store produce, and the restricted range of winter fruits. With a little foresight and effort however, the handy woman can provide herself and her family with a bountiful supply of preserved and dried fruits, jellies and fruit juices at small cost. At the same time she will derive considerable satisfaction in lining her cupboard shelves with produce obtained cheaply at the height of the harvest season.

Economical Fruit Preserving.

MANY people imagine that it is necessary to go to great expense in buying equipment for fruit preserving. It might surprise them to know that they have in their own homes practically everything required for bottling or drying fruit.

Let us first consider bottling. Jars are needed and these may be special preserving jars with rubber rings, but if these are not on hand, treacle or powdered milk tins with press-in lids may be used and a little melted wax poured round the rim. Pickle bottles with corks (boiled 10 minutes) are useful for small fruits or pulp. After filling, the cork is pushed in, a knitting needle or skewer being held inside to allow air to escape as the cork is pushed in. The cork is then dipped in melted wax or fat.

A very satisfactory seal can be made for any glass jar, no matter what size or shape, and this would be a useful suggestion where the lid of a preserving jar is lost or defective. Put 8 oz. resin, 1 oz. beeswax, 1 oz. vaseline into a tin and stand in a saucepan of boiling water to melt. Mix well. Cut circles of clean cloth about 2 inches wider than the mouth of the jar, and circles of paper to exactly fit the opening. Dip the centre of the cloth into the melted wax and place the paper on it. The cover is now ready. These covers may be prepared before the preserving is done. When the fruit is ready the jar is filled to overflowing with boiling syrup, the cover put on with the paper over the mouth of the jar, and tied with string. If necessary the top of the jar

may be dipped into the melted wax. On cooling the cover is drawn in, showing the seal is effective.

For a sterilizer there are numbers of suitable substitutes—a washing copper, a boiler, a kerosene tin, a large saucepan, or a cool oven. For a stand to keep the glass off the bottom of the sterilizer use grilling stand, cake cooler, pieces of wood supported on bricks or blocks, cloths, or straw packed in the bottom of the container. Should a lid not be available, then a damp sugar bag or similar article can take its place.

Many women take delight in producing first-class preserved fruits with simple or makeshift equipment, and here, besides helping her family, she can assist the State by using the surplus fruits from our orchards.

Some other points in economical preserving are—by pulping, more fruit can be preserved in a bottle; drying is a cheap method of preserving and requires little storage space; large quantities of beans may be preserved by dry-salting.

Fruit Drying.

THE drying of fruit is an inexpensive and simple method of preservation, and one particularly suited to present conditions. Fruit may be sun dried, oven dried, or dehydrated in a current of hot air. The following simple methods will be found useful:—

Drying on sheets on a sunny verandah or on a gently sloping roof.

Drying on wooden trays or racks in the sun.

Drying in a warm oven with the door partly open.

Drying on racks over a stove.

Apricots, apples, pears, peaches, figs, nectarines, and grapes are suited to this method of preservation. Little preparation is necessary. Most fruits are dried either whole or in halves. Apples and pears are peeled.

There are two operations—dipping, which is used for plums, figs, and some times grapes, and sulphuring, used for light-coloured fruits, such as apricots. Sulphuring and dipping are not essential in home drying, but help to give the product a better appearance.

For dipping a solution is made by allowing 1 oz. of caustic soda to a gallon of water. A few pieces of fruit are dipped into the boiling solution to test strength and time required. If the fruit bursts, the solution is too strong. A frying basket or a tin with holes punched in it may be used for dipping. This process removes the bloom, and causes minute cracks on the surface, thus hastening the drying process. The test for length of time required is *the commencement of this pitting*, generally from 10 to 15 seconds. After dipping pass through cold water to rinse.

Sulphuring is done to prevent insects from attacking, to improve the colour, and to hasten the drying. For small amounts of fruit sulphuring can be done in glass jars. Burn some flowers of sulphur on a tin lid by igniting with a live coal. Invert wide mouthed jars in succession over the sulphur to collect the fumes. As each jar is filled turn up the right way and cover with a glass lid or plate. Fruit is put into the jars, shaken occasionally, and sulphured for the time required.

Another method is to burn sulphur on a lid in the bottom of a box—a few ounces would be sufficient for a large quantity of fruit, generally a pound of sulphur is allowed to 100 cubic feet of box space. The fruit is put on trays in the box, and the box covered with lid.

Apples.

When drying use firm, mature fruit; peel, core, and slice (this is best done by a small hand machine if quantities are being prepared). Dip into salt water—2 tablespoonsful of salt to a gallon of water for about 5 minutes. Spread on trays or sheets to dry in the sun and turn occasionally. Dry till the fruit is pliable and no moisture will appear on a broken edge. This generally takes about 3 days.

Pears.

Pears are peeled, cored, halved, sulphured in jars for about 20 to 30 minutes, and dried as described. Williams' Bon Chretien is a suitable variety to dry.

Apricots.

Apricots are halved and the cut side placed uppermost—they are then sulphured for a period of from 4 to 5 hours in a sulphur box. The drying will take about 3 or 4 days.

Peaches.

Peaches suitable for drying are the firm yellow-fleshed free-stone varieties. They are dried in the same way as apricots, but take longer.

Plums.

Plums of both light and dark varieties may be dried. They may be given a soda dip before drying, and afterwards glossed by dipping in a boiling solution of glycerine and water (1 part glycerine to 16 parts water), and left in a heap for a day before packing.

Figs.

Figs are dried when quite ripe. They may be given a soda dip before drying. Before packing, they may be dipped in a rock salt solution (3 oz. rock salt to 1 gallon of water).

Before packing dried fruit it is "conditioned," that is, put in a heap for a day to allow the moisture content to become even. It is then stored in jars, packages, boxes, or tins, but in the case of tins and boxes it should be wrapped carefully in grease-proof paper.

Fruit Butters.

FRUIT butters are similar to jams, but are of a stiffer consistency and a more even texture. As luncheon spreads for sandwiches or biscuits they are very useful to the housewife. Apples form the foundation for many butters, but plums, grapes, pears, and tomatoes are used also.

There are two methods of making fruit butters. The first is the puree method, which is explained hereunder:—

Prepare small containers—pots or small jars. Weigh or measure the fruit. Wash and cut up roughly. Cook gently with a little fruit juice or water—just sufficient to prevent burning—until tender. Press through a sieve. Simmer gently until the sputtering begins. Add the sugar—generally half a cup of sugar to a cup of puree—and cook until the test is given. To test, place a little fruit on a plate and stand to cool. If liquid does not separate out, it is done. Another test of the consistency is that it can be heaped on a spoon. Fill jars, seal and label.

By the use of the above method a wide range of butters can be made by combining different fruits and flavours. Generally speaking, 3 lb. of fruit is sufficient to make up at one time.

Apple Butter.—Prepare as above, but sugar is not generally needed. Cinnamon or lemon may be used as a flavour.

Apple and Raisin, or Apple and Sultana.—As above. Use ½ lb. raisins or sultanas to 1½ lb. apple, and juice and rind of a lemon.

Apple and Date.—4 oz. dates to 1 lb. apples and juice of 2 lemons—sugar not necessary.

Apple and Grape.—Use equal quantities of grapes and apples.

Apple and Banana.—Proportion of 1 apple, 1 banana, ½ lemon.

Apple and Tomato.—1 lb. apples, 1 lb. tomatoes, rind of ½ orange.

Apple and Pear.—1 lb. apples, 1 lb. pears, 1 teaspoonful cinnamon, 1 teaspoonful ground ginger.

Apple and Mint.—1 lb. apples, 2 cups chopped mint leaves, ¼ cup vinegar.

Apple and Parsley.—1 lb. apples, 2 cups parsley (chopped), juice of 2 lemons.

Raisin Butter.—Cook 5 lb. raisins until they will go through a colander. Add ½ teaspoonful each cinnamon, cloves, all spice, nutmeg, and 2 cups sugar. Cook till the test is given.

Orange Butter.—Wash fruit, remove stems, seeds, and blemishes, and slice. Cover with water and cook till tender (about 1½ hours). Mash through a sieve. Add ½ lb. sugar to 1 lb. fruit. Cook till the test is given.

Plum Butter.—Vinegar may be used in place of water.

Pear Butter.—Lemon juice, ginger or cinnamon to taste, may be added. Brown sugar may be used in place of white.

The second method of making butters is used for lemons, passion fruit, dried apricots, and bananas, and requires the addition of eggs and butter. Butter and sugar are creamed, beaten eggs added, then fruit juice or mashed fruit. The mixture is double boiled till thick.

Lemon Butter.—2 oz. butter, ¼ pint water, ¼ pint strained lemon juice, 3 eggs, 1 lb. sugar, rind of 2 lemons.

Dried Apricot Butter.—¼ lb. dried apricots, ¼ lb. sugar, 2 oz. butter, 2 eggs. Wash apricots and soak over-night. Stew in a very little water till tender. Mash through a sieve. Continue as for second method as set out above.

Passionfruit Butter.—2 oz. butter, pulp of 8 passionfruit, 1 lb. sugar, 3 eggs, 4 tablespoons lemon juice, 4 tablespoons water.

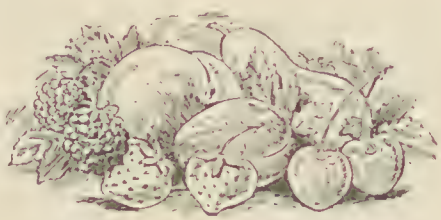
Banana Butter.—4 bananas, juice of 2 lemons, 2 oz. butter, 1¼ cups sugar, 3 eggs.

Peanut Butter.—Roast the peanuts in a moderate oven for about half an hour stirring occasionly so that they will not burn. Remove red skins and grind in a mincing machine or mill. When smooth and soft press into jars and seal. Salt to taste may be added during the first mincing.

Fruit Preserving Calendar.

Month.	Fruit in Season.	Methods of Preserving.
January ..	Cherries	Bottling, conserve, crystallizing, syrup
	Loganberries	Bottling, jam, jelly, juice, syrup
	Raspberries	Bottling, jam, jelly, juice, syrup, vinegar
	Apricots	Bottling, drying, jam, chutney, crystallizing
	Strawberries	Conserve, jam, syrup, bottling (not very reliable)
	Red currants	Jelly, bottling, juice, jam
	Mango	Chutney, jam
	Plums	Bottling, drying, jam, jelly, sauce, crystallizing butter
	Mulberries	Bottling, jam
	Black currants	Jam, syrup
	Bananas	Jams, bottling
February ..	Apples	Bottling (pulp), jams, jelly, chutney, butters, juice. (Apples may be mixed with rhubarb, mint, lemon, and raspberry.)
	Plums	See January
	Pears	Bottling, jam, drying, pickling, crystallizing, butter
	Nectarines	Bottling, drying
	Crab apple	Jelly
	Figs	Bottling, drying, jam, pickling
	Quince	Bottling, jelly, jam, juice
	Peaches	Bottling, jam, drying, crystallizing
	Grapes	Drying, bottling, jam, jelly, juice, butter
March ..	Apples, pears, peaches, figs, quinces	See February
	Blackberries	Bottling, jam, jelly (with apple), juice (with strawberries)
	Cape gooseberries	Conserve, jam
April ..	Passionfruit	Jam, juice, syrup, butter, jelly
	Melons	Jam, jelly, pickles, chutney

Many fruits are obtainable over a longer period than stated; but the main months only are given. Those fruits mentioned in January are also in season in December.



Neutralization of Sour Cream for Buttermaking

3.—Some Factors Affecting the Accuracy of Neutralization

by F. S. J. NEWMAN, B.Ag.Sc., and W. J. WILEY, D.Sc., Dairy Research Officer of the Council for Scientific and Industrial Research.

THE accuracy of the reduction in acidity obtained during the process of neutralization is a subject that has been widely studied. In many cases the published results of various workers are conflicting, especially in the case of sodium bicarbonate type neutralizers.

The fact that lime type neutralizers exercise only about 80 per cent. of their theoretical equivalence when used to reduce the acidity of cream has been pointed out by Hunziker (1), Walts and Libbert (2) and more recently by Wiley (3) all of whom secured very similar results. Hunziker explains this divergence from the theoretical acid reduction as being due to combination between a portion of the lime and the casein present. On the other hand Wiley attributes it to the increased buffering power of the cream caused by the precipitation of tricalcium phosphate in the presence of the excess calcium contributed by the neutralizer and brings forward experimental evidence to support this contention. His results also showed that the proportional reduction in acidity obtained with lime was constant over a large range of initial acidities even before the cream was pasteurized.

Sodium type neutralizers are generally assumed to give a linear reduction in acidity and are not subject to the error noted with lime. However, many conflicting results have been obtained with them as can be seen from the following brief review.

Ramsay (4), working with sodium bicarbonate found that it gave a reduction in acidity of 94 to 104 per cent. of the theoretical amount even though the cream was not pasteurized, a fact which immediately lays the work open to criticism. The author makes no attempt to explain this abnormal result. In further experiments carried out in commercial factories it was found that with flash pasteurized cream, sodium bicarbonate exercised 113 per cent. of its theoretical value, whilst with batch pasteurized cream this figure was reduced to 75 per cent. Valentine (5), as the result of numerous experiments done under commercial conditions, found that "1 lb. of sodium bicarbonate would neutralize 1·2 lb. of lactic acid." This figure gives a reduction of 112 per cent. of the theoretical. These results were not confirmed by Walts and Libbert (2) and Wiley (3) who found the calculated reduction in acidity was obtained when sodium bicarbonate type neutralizers were used to reduce the acidity of cream to approximately 0·13 per cent. Below this figure, however, reduction was incomplete. Wiley, working with milk, found that before pasteurization sodium bicarbonate exercised 88 per cent. of its theoretical value when attempting to neutralize milk of 0·6 per cent. acidity to a calculated acidity of ·40 per cent. For a calculated final acidity of ·10 per cent. this figure fell to 42 per cent. After flash pasteurization (by a laboratory method) of the same neutralized milks it was found that sodium bicarbonate exercised its theoretical value to an acidity of 0·13 per cent. Beyond this point departure from the stoichiochemical relationship was evident. At a calculated final acidity of ·05 per cent. sodium bicarbonate was found to exercise only 78 per cent. of its theoretical equivalence. The author attributes this departure from the theoretical reduction to the retention of carbon dioxide.

McDowall and McDowell (6) working with fresh, sour and acidified milk confirm Wiley's findings regarding sour milk. With fresh milk it was found that sodium bicarbonate exercised more than its theoretical equivalence after flash pasteurization. This discrepancy was found to be due to the presence of carbon dioxide in the milk. The carbon dioxide content of the fresh milk was sufficient to seriously affect the titratable acidity, while that of the sour and acidified milk was not sufficient to do so. The results of McDowall and McDowell serve to explain the anomalous neutralization equivalent noted by Valentine (loc. cit.) who, as these authors suggest, probably used creams of high carbon dioxide content.

Townley and Gould (7), working with creams of high initial acidity, determined the degree of acidity reduction given by various neutralizers in batch pasteurized creams. In general, the results show that for reduction to calculated acidities of about 0·25 per cent. neutralizers exercise considerably more than their theoretical equivalence, but for acidities of 0·15 per cent. slightly less. For lower calculated acidities than this there is considerable divergence from the theoretical figure. One set of results published by these authors is particularly interesting. On neutralizing cream with an initial acidity of 0·52 per cent., to the following theoretical acidities with sodium hydroxide, 0·25, 0·15, 0·10, 0·05 and 0·00 per cent. it was found that the percentage reductions, expressed in terms of the theoretical reduction, were obtained, 123·2, 112·1, 102·4, 96·8 and 91·4. The authors make no attempt to explain these results, even though the original acidity of the cream was calculated on the basis of a sodium hydroxide titration. It seems probable that the cause of the abnormality of these results is the failure to recognize the possible effect of carbon dioxide when performing the original titration. As pointed out in Part 1 of this series of papers, this can lead to serious differences in the apparent titratable acidity of sour cream. The falling off in efficiency of the sodium hydroxide for lower theoretical acidities is possibly due to increased difficulty in expelling the carbon dioxide from the more alkaline creams. The temperature of pasteurization in this case was 145° F. applied for half an hour. These authors also quote results showing that the temperature of pasteurization does not seriously affect the final acidity of creams neutralized to the acidities previously mentioned. However, the results were all obtained with batch pasteurized creams under laboratory conditions and cannot be considered applicable to flash or vacuum pasteurized creams.

Obviously the accuracy of neutralization is influenced by the reliability of the determination of the initial acidity of the cream. This factor was discussed in the first paper of this series, and a method capable of giving reproducible results was indicated. It seems probable that many of the abnormal results noted, particularly in the case of experiments carried out in factories were due to the method of titration used.

Besides this factor there are others, two of which will be discussed in this paper—

(*a*) The effect of carbon dioxide in neutralized cream.

(*b*) The effect of bacterial action in the period of time elapsing between the addition of the neutralizer and pasteurization.

(a) The Effect of Carbon Dioxide in Neutralized Cream.

When neutralizers of the sodium bicarbonate type are used full reduction in the acidity of the cream cannot be attained until after pasteurization. Sodium bicarbonate is natural to phenolphthalein, and consequently, until carbon dioxide has been expelled, neutralization to this indicator cannot be attained. As previously noted Wiley (3) and McDowall and McDowell (6), working with milk in laboratory experiments, observed that when sodium bicarbonate was used as a neutralizer, departure from the linear reduction in acidity was observed when the milk was neutralized to theoretical acidities of less than 0·12 per cent. Both authors attributed this departure to the difficulty in expelling carbon dioxide during pasteurization. The latter workers brought forward experimental evidence to prove this contention.

This acidity in milk would correspond to one of 0·07 per cent. in a 40 per cent. cream. With pasteurization " in vacuo " it is possible to successfully attain lower theoretical acidities than this when sodium bicarbonate is used as a neutralizer. McDowall and McDowell mention this in their work but do not give any experimental results. The results quoted in this section were obtained from creams pasteurized under commercial conditions in a " Baby Tandem Vacreator."

TABLE 1.—CREAM ACIDITIES FOUND AFTER NEUTRALIZING TO CALCULATED ACIDITY.

Calculated Final Acidity.	Initial Acidity of Cream.			
	0·40–0·49.	0·30–0·39.	0·20–0·29.	0·10–0·19.
0·10	0·10 (3)	0·10 (2)	0·10 (1)	0·10 (2)
0·08	0·08 (3)	0·07 (2)	0·08 (1)	0·08 (4)
0·06	0·05 (2)	0·06 (2)	0·06 (1)	0·05 (1)
0·04	0·05 (1)	0·05 (1)	0·05 (1)	0·05 (1)
0·02	0·05 (1)	0·05 (1)	0·05 (1)	0·05 (1)
0·00	0·03 (7)	0·03 (6)	0·03 (1)	0·03 (1)
−0·05	0·01 (1)	..	0·01 (1)	..
−0·10	Alkaline (2)	Alkaline (2)	..	Alkaline (1)
−20	..	Alkaline (1)	..	..

Note: The numbers in brackets represent the number of creams in each group.

TABLE II.—TITRATABLE ACIDITY AND CARBON DIOXIDE CONTENT OF NEUTRALIZED, PASTEURIZED CREAMS.

Calculated Acidity Per cent. Lactic Acid.	Acidity Attained Per cent. Lactic Acid.	Difference.	pH.	CO_2 Grams Per cent.	Difference in Acidity a Gram Equivalents per Litre X10³.	CO_2 as Gram Equivalents per Litre X10³.
·12	·13	·10	6·43	·0007	1·11	·318
·12	·11	— ·01	6·80	·0017	(— 1·11)	·772
·08	·09	·01	7·13	·0064	1·11	2.92
·07	·07	..	7·13	·0018	..	·82
·05	·05	..	..	·0026	..	1·20
·05	·05	..	7·43	·0033	..	1·50
·03	·05	·02	7·45	·0053	2·22	2·40
·00	·03	·03	7·59	·0059	3·33	2·68
·00	·03	·03	7·63	·0056	3·33	2·54
·00	·04	·04	7·38	·0064	4·45	2·92
— ·03	·02	·05	..	·0081	5·56	3·72
— ·06	·01	·07	..	·0141	7·78	6·44
— ·15	Alkaline	..	8·53	·0396	..	18·0
— ·20	Alkaline	..	8·40	·0493	..	22·4

Table 1 summarizes the results obtained from 54 creams of widely varying initial acidities after pasteurization. The neutralizers used were of the sodium bicarbonate and sesquicarbonate type. No significant difference in the final acidity was observed when two batches of the same cream were similarly treated with the two types of neutralizer. The initial acidities of these creams were determined by the method described in Part 1 of this series. The final acidities were determined by the same method except that the process of boiling prior to titration was dispensed with.

In addition to acidity determinations the carbon dioxide content of certain of the creams included in Table 1, and of some other creams was determined by the method of McDowall (8). The results of these determinations are set out in Table II.

(b) The Effect of Bacterial Action in the Neutralized, Unpasteurized Cream.

The rate of production of acid by S. lactis under the conditions existing when sour cream has been partially neutralized by the addition of alkali, and before it has been pasteurized does not appear to have been studied. The fact that the inhibition of this organism in sour cream is due to the lowering of the pH of the medium to about 4·5, and not to any insufficiency of lactose is well recognised. It is well known also that if the pH of the medium is adjusted to values at which this inhibiting effect is either partially or totally removed, that the production of lactic acid will recommence. The point which seems to have escaped notice is the rapidity with which this process can occur, under suitable temperature conditions, in neutralized unpasteurized creams of high initial acidity. Table III. sets out typical results obtained under laboratory conditions with creams of varying initial acidities, neutralized, and held at different temperatures without pasteurization. In this case the acidities were determined on weighed samples which were boiled prior to titration.

The results obtained for neutralized creams held under factory conditions and pasteurized by two different methods are given in Table IV. to show the order of the discrepancies which can occur in practice, particularly when preheating is resorted to. These creams were heated to the temperatures stated, neutralized and then held at this

temperature with constant agitation. After the stated period pasteurization was commenced. As this process usually lasted about 30–35 minutes, the latter portion of the cream would be held unpasteurized for about an hour in the majority of cases previously mentioned.

TABLE III.—DEVELOPMENT OF ACIDITY IN NEUTRALIZED, UNPASTEURIZED CREAMS.

Holding Temperature °F.	Time of Holding Hours.				
	0	½	1	1½	2
80	·06	·07	·10	·16	·23
90	·08	·11	·15	·20	·25
100	·08	·10	·15	·20	·25
110	·08	·11	·15	·20	·25

Discussion of Results.

(a) Effect of Carbon dioxide.

The results set out in Table I. show that when creams are pasteurized "in vacuo," sodium bicarbonate type neutralizers give the theoretical reduction in acidity when neutralizing to acidities of 0·05 per cent. or higher. Below this value departure from the linear relationship becomes evident. Even the addition of a considerable excess of neutralizer failed to give a pasteurized cream alkaline to phenolphthalein.

The initial acidity of the cream did not affect in any way the final acidity of the neutralized pasteurized cream. This is contrary to many of the opinions expressed on this aspect of neutralization. The popular belief on this subject is that very sour creams should not be neutralized to as low acidities as sweeter creams because "over neutralization" is likely to occur. Undoubtedly this effect when observed is due to the presence of more carbon dioxide in very sour creams, which is normally included in the initial acidity titration. The results quoted in this paper show that if the precaution of expelling this carbon dioxide is taken, prior to the initial titration, the same results are obtained with both types of cream.

The carbon dioxide content of neutralized creams while rising with the addition of increasing amounts of neutralizer, on recalculation to equivalents of a monabasic acid, does not account for the departure from the stoichiochemical relationship observed. In this regard the results of McDowall and McDowell (6) are of interest. These workers found that in milk, the relationship between added carbon dioxide and increased titratable acidity was linear, 10 volumes per cent. of carbon dioxide being equivalent to 0·032 per cent. lactic acid. They also point out that, in this case, carbon dioxide exercises only about 80 per cent. of its theoretical equivalence as a monobasic acid. On the other hand, when the carbon dioxide of neutralized milks was determined, it was found that the carbon dioxide content of milks to which considerable quantities of sodium bicarbonate had been added, was insufficient to account for the excess acidity present. The results of the present experiment confirm their results. From the point of view of commercial neutralization of cream with the type of machinery at present in use, there seems to be little use in endeavouring to reduce the acidity of the cream to less than 0.05 per cent., since it involves the addition and waste of a considerable excess of neutralizer. It has been shown that butters having a satisfactory pH value can be obtained from creams with acidities of this order, so that no good purpose is served by neutralizing to lower acidities.

(b) The Effect of Bacterial Action.

The experimental results quoted are sufficient to show that under both laboratory and factory

TABLE IV.—DEVELOPMENT OF ACIDITY IN CREAM BEFORE PASTEURIZATION UNDER FACTORY CONDITIONS.

Initial Acidity.	Calculated Final Acidity.	Acidity After Pasteurization.	pH after Pasteurization.	Preheating Temperature °F.	Time Held (Mins.)	Pasteurizer.	Temperature on Pasteurization °F.
·33	Nil	·09	6·90	110	30	Universal	185
·35	Nil	·07	7·03	110	30	Vacreator	203
·41	Nil	·09	6·93	120	25	Universal	187
·21	Nil	·10	6·75	115	35	Universal	185
·17	·04	0·9	6·78	85	60	Vacreator	200

[Continued on Page 101

Seed Certification in Victoria

Areas Approved and List of Registered Growers for 1941-42 Season

SEED certification schemes are in operation in Victoria in respect of the following species and strains of pasture seeds:—

Victorian perennial rye grass.
Tallarook "Late Flowering" subterranean clover.
Bacchus Marsh "Early Flowering" subterranean clover.
Phalaris tuberosa.
Victorian Irrigation White Clover.

The approximate areas for which application has been made and approval granted for the current season are set out in the following table:—

VICTORIAN PERENNIAL RYE GRASS.

	Acres.
Shires of Colac, Winchelsea, Barrabool, Hampden, Mortlake, Minhamite, Warrnambool, Ararat, and Kowree. R.G. 101-200, 251-286, 289, 401-446 ..	7,650
Shires of Ballarat, Creswick, Talbot, Lexton, and Grenville. R.G. 1-100, 301-326	5,000
Shires of Kyneton, Glenlyon and Newham, Woodend. R.G. 201-228	650
Shires of Berwick and Lilydale. R.G. 287, 288, 290	300
Total	13,600

	Acres.
Bacchus Marsh subterranean clover	60
Tallarook subterranean clover ..	70
Victorian irrigation white clover ..	190
Phalaris tuberosa	520

As a result of a favourable season in most of the seed-growing districts, the area of perennial rye grass approved for the production of certified seed is considerably greater than usual. For various reasons it is estimated, however, that because of scarcity of labour and pressure of other work connected with a generally heavy harvest, only about half of the area approved has been actually harvested for seed. Even so, the quantity harvested should be well above the average for the last five years, with a large number of growers handling, for the most part, small to medium quantities of seed.

GROWERS OF CERTIFIED SEED, AND REGISTRATION NUMBERS.

Victorian Perennial Rye Grass.

R.G.— 1. Pickford, A., Clunes.
2. Pickford, H., Clunes.
5. Bridgewater, E. S., Learmonth.
6. Toose, H. A., Smeaton.
9. Troup, G. C., Tourello.
10. Sewell, C. W., Kooroocheang.
15. Wickham, T. B., Clunes.
16. Robinson, H. J., Clunes.
17. Thomas, G. F., Ascot.
18. Branigan, J. S., Jr., Clunes.
19. Pickford, C. A., Clunes.
20. Pickford, J., Clunes.
21. Foulkes, W. C., Clunes.
22. Williams, A., Smeaton.
24. Evans, J., Smeaton.
26. McLeod, W. A., Springmount.
27. McCrum, J., Smeaton.
28. McKinnon, A., Smeaton.
29. Grieve, W. M., Kangaroo Hills.
30. Grieve, H. J., Smeaton.
31. Sewell, A. J. and D. H., Smeaton.
32. Pickering, K. A., Smeaton.
33. Toose, G. C. and A. W., Smeaton.
34. Clarkson, E. W., Tourello.
35. May, W. H., Smeaton.
36. McPhan, J., Kingston.
41. Muller, C. T., Ullina.
42. Judson, J., Blampied.
43. Carter, J. R., Clunes.
44. Drife, G. R. H., Clunes.
45. Marshall, J., Ullina.
46. Cosgrave Bros., Smeaton.
47. Bunn, J., Allendane.
50. Cook, W., Clunes.

Victorian Perennial Rye Grass—continued.

R.G.—51. Drife, C. J. H., Clunes.
52. Drife, T. W., Clunes.
53. Griffin, J. M., Coghill's Creek.
54. Hives, J. H., Kingston.
55. Muller, Mrs. M., Smeaton.
57. Kinnersly, F., Glendaruel.
58. McCallum, W., Ascot.
59. Armstrong, J. R., Allendale.
63. Taylor, W. J., Smeaton.
65. Judson, F. H., Blampied.
67. Russell, J. A., Kingston.
69. McLennan, A. C., Clunes.
70. Slattery, J. P., Bald Hills.
72. Ford, E. H., Clunes.
74. Redman Bros., Smeaton.
76. Donovan, P., Learmonth.
78. Baird, D., Blowhard.
79. Crick, C. T., Blowhard.
80. Grills, J. C., Blowhard.
81. Grills, J., Miners' Rest.
86. McColl, A., Miners' Rest.
88. Wrathall, D. W., Clunes.
89. Trewin, L., Coghill's Creek.
92. Cox, H. S., Miners' Rest.
93. Luhrs, C. R., Wendouree.
99. White, R. T., Cardigan.
102. Higgins, F. W., Irrewarra.
104. Currington, A. H., Warncoort.
107. England, S., Warncoort.
108. England, W., Warncoort.
109. Hawtin, A. W., Colac West.
112. Hawtin, F., Colac West.
114. Hay Bros., Cororooke.
116. Kenny, M., Cororooke.
118. Martin, H. L., Irrewarra.
119. Menzel, C., Armytage.
120. Menzel, R. K., Armytage.
121. Morrell, J. B., Beeac.
122. McDonald, A., Beeac.
124. Ramsay, R. A., Birregurra.
125. Roache, J., Nalangil.
126. Roache, P., Nalangil.
128. Ryan, D. M., Nalangil.
132. Armstrong, A., Irrewarra.
133. Rankin, A., Colac.
134. Baulch, G., Larpent.
136. Baggott, M., Cororooke.
137. Drewry, C. G., Ondit.
139. Barnard, J. C., Beeac.
140. Dignan Bros., Warncoort.
141. Hughes, A., Larpent.
142. McDonald J. J., and Sons, Birregurra.
148. Middleton, A. H., Nalangil.
150. Speirs, A., Nalangil.
155. Vagg, C., Larpent.
158. Spalding Bros., Larpent.
160. Billings, F., Colac.
166. Inglis, A. D. C., Larpent.
167. Speirs, F., Nalangil.
169. Collins, C. J., Irrewarra.
173. Brien, A. J. and Sons, Birregurra.
178. Buckle, W., Larpent.
181. Gubbins, N. O., Birregurra.
201. Bolton, P., Malmsbury.
202. Ward, A. H., Kyneton.
203. Olive, E., Kyneton.
205. Brady, F., Kyneton.

R.G.—206. Hutcheson, S. G., Kyneton.
207. Sullivan, T. M., Malmsbury.
210. Donovan, J., Malmsbury.
213. Thomson, R. H., Kyneton.
214. Geddis, R., Kyneton.
215. Willmott, J. J., Kyneton.
217. Young, H. H., Malmsbury.
219. McDonald, C., Kyneton.
223. Sewell, Mrs. A. V., Glenlyon.
224. Portwine, E. C., Lauriston.
225. Trewhella, C. and A. B., Newham, via Woodend.
226. Dettmann, W., Kyneton.
227. Rollinson Bros., Green Hill.
228. Douglas, F., Redesdale Junction.
251. Bucholz, L., Lismore.
256. Troup, W. M., Kolora.
257. Mahony, J., Kolora.
258. Maloney, P., Kolora.
262. Cooper, J., Mortlake.
265. McConnell, C. L., Kolora.
267. Murnane, J., Terang.
271. Sadler, L. G., Glenormiston.
275. Purcell, M., Bessiebelle.
278. Kennedy, M., Winslow.
285. Morgan, R. J., Terang.
286. Mahony, M. F., Westmere.
287. Lithgow, F. B., Coldstream.
288. Ross, W. R., Coldstream.
289. Thomas, R., Apsley.
290. Baillieu, M. L., Beaconsfield.
305. Swan, J. M., Burrumbeet.
306. Walton, W. A., Burrumbeet.
307. Robinson, H. and E. J., Kooroocheang.
310. Risk, W., Ullina.
311. Ritchie, J. F., Tourello.
312. Cummins, W. J., Ascot.
313. Luhrs, C. M., Wendouree.
314. Wilson, R. J., Lawrence.
315. Kierce, J., Clunes.
316. Greenwell, W. J., Allendale.
317. Keith, H. C., Ullina.
318. Tennant, S., Lawrence.
319. Hepburn, D., Kooroocheang.
320. Mezzini, W., Kooroocheang.
321. Gervasoni, N. A., Kooroocheang.
322. Clark, A., Glen Brae, via Waubra.
323. Irving, L., Miners' Rest.
324. Lobb, J. J., Glen Brae, via Waubra.
325. Andean Bros., Kangaroo Hills.
326. Ryan, G., Blowhard.
406. Roache, D., Nalangil.
407. Menzel, A. A., Winchelsea.
408. Walsh, J., Swan Marsh.
409. Baudinette, Mrs., Larpent.
411. Sutherland, A. J., Nalangil.
419. Sutherland, J., Nalangil.
421. Worland, C. F., Winchelsea.
422. Craig, N. and I., Winchelsea.
423. Craig, N. and I., Buckley.
424. Nicholas, A. H., Birregurra.
425. Jepson, P., Pirron Yallock.
426. Finlay, E., Coragulac.
427. Hawtin, F. W., Colac.
428. Baker, E. C., Birregurra.
429. Buchanan, C., Irrewarra.
430. Heppell, W. H., Nalangil.

Victorian Perennial Rye Grass—continued.

R.G.—431. Bourke, James, Cororooke.
432. McGrath, F., Irrewillipe East.
433. Reeves, T. T., Colac.
434. Vagg, L., Pirron Yallock.
435. Arnold, H., Larpent.
436. Stewart Bros., Birregurra.
437. Bourke, John M., Cororooke.
438. Johnston, S. A., Birregurra.
439. Coad, E., Ondit.
440. Underwood, J., Larpent.
441. Kilpatrick, W. B., Alvie.
442. Ray, Geo., Warrion.
443. Warrowrie Estate, Irrewarra.
444. Burns, A., Corunnun.
445. Lidgerwood, R. W. Birregurra.
446. Lyness, J., Colac West.

Tallarook "Late Flowering" Subterranean Clover.

TK.—1 Head, A. C. and Son, Seymour.
5. Head, A. C. and Son, Shepparton.

Bacchus Marsh "Early Flowering" Subterranean Clover.

B.M.—1. Toose, G. C. and A. W., Smeaton.
2. Redman, F. C., Smeaton.

Phalaris Tuberosa.

P.T.—1. Wilson, A. F., Beaconsfield.
2. Larmour, R., Berrybank.
6. Cameron, E. H., Challicum Hills, Buangor.
7. Tucker, L. E. and Sons, Vite Vite.
9. Bucholz, L., Lismore.
10. Calvert, N., Nerrin Nerrin.
11. Thomas, R., Apsley.
12. Moller, R. N., Kyvalley.
13. Trewhella, C. and A. B., Newham, via Woodend.

Victorian Irrigation White Clover.

T.W.—1. Jackman, A. T., Dingee.
2. Hamley, H. J., Dingee.
3. Jackman, J. W., Dingee.
5. Jackman, F., Dingee.
6. Moller, R. N., Kyvalley.
7. McEwen, J., Stanhope.

Neutralization of Sour Cream for Buttermaking—*continued from page 98.*

conditions, the time that elapses between the addition of the neutralizer and the commencement of pasteurization can have an important bearing on the accuracy of neutralization. Both Wiley (3) and McDowall and McDowell (6) have demonstrated that the pH of sour milk prior to pasteurization is increased by the addition of sodium bicarbonate. Although this increase is not so great as that found after pasteurization, it is apparently sufficient to allow the bacteria to recommence activity. The brevity of the "lag phase" after the addition of the neutralizer is surprising. Two possible explanations of this are offered; firstly, the "dense" bacterial population present in sour cream, and secondly, that a condition of complete bacteriostasis may not have been reached. The results given in Table IV. show that under factory conditions an appreciable increase in acidity can occur prior to pasteurization. The creams which were neutralized to a calculated final acidity of nil would be expected to have an actual acidity of 0·03 if pasteurization had been commenced immediately (Table I.). However they had an actual acidity of 0·07 to 0·09 although held about 30 minutes only between neutralization and pasteurization.

It is evident that inaccuracies can quite easily occur when large batches of cream are neutralized, and an appreciable time elapses before completion of pasteurization. The cream should be neutralized and held at as low a temperature as is consistent with efficient stirring. The results also offer a trenchant criticism of many earlier experiments designed to determine "the rate of reaction of neutralizers prior to pasteurization."

References.

(1) Hunziker (1927). The Butter Industry, 2nd Ed.
(2) Walts and Libbert (1930). Ark. Ag. Expt. Stn. Bull. 249.
(3) Wiley (1935). J. Dairy Res. 7, 91.
(4) Ramsay (1920). Dept. Agr. N.S.W. Sci. Bull. 17.
(5) Valantine (1925). N.Z. J. Agric. 31, 1.
(6) McDowall and McDowell (1937). N.Z. J. Sci. and Tech. 19, 296.
(7) Townley and Gould (1940). Canad. Dairy and Ice Cream J. 19, 5, 54.
(8) McDowall (1936). Dairy Res. Inst. (N.Z.) Pub. 77.

Registered Fertilizers

Analysis and Unit Values

Fertilizers Act 1928 (No. 3680).

UNIT VALUES FOR THE YEAR 1942.

	£	s.	d.
Nitrogen, organic, as Blood; Blood and Bone; Blood, Bone, and Flesh; and Fine Bone ..	0	19	4
„ as Coarse Bone and in Bone Fertilizers	0	18	6
„ as Nitrate	1	1	11
„ as Ammonia	0	12	7
Phosphoric Acid—			
as Water Soluble	0	6	2
as Citrate Soluble—			
in Blood and Bone and Animal Fertilizers and in Mixed and Complete Fertilizers containing either or both of the foregoing	0	4	7
in all other Fertilizers	0	4	6
as Citrate Insoluble—			
in Blood and Bone and Animal Fertilizers, and in Mixed and Complete Fertilizers containing either or both of the foregoing	0	3	7
in other Mixed Fertilizers and in Ground Phosphate	0	4	2
in other Fertilizers	0	2	0
as Fine Bone	0	5	4
as Coarse Bone	0	4	10
Potash—			
as Sulphate	0	8	10
as Chloride	0	8	0

Melbourne, 31st December, 1941.

W. R. JEWELL, M.Sc., F.I.C.,
Chemist for Agriculture.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942.

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*			Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		£	s.	d.	
Nitrogenous—Readily Available.		%	%	%	%	%	%	%	%	%	%	%				
Nitrate of Soda	Sickle in diamond	15·50	..	..	..	..	15·50	..	..	..	..	..	17	0	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Sulphate of Ammonia	M.G. Co. in diamond	..	20·59	..	..	..	20·59	..	..	..	..	..	13	0	0	The Metropolitan Gas Co., 196 Flinders-st., Melbourne
„ „	Pivot ..	..	20·60	..	..	..	20·60	..	..	..	..	..	13	0	0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
„ „	Sickle in diamond	..	20·60	..	..	..	20·60	..	..	..	..	..	13	0	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
„ „	Cresco ..	..	20·60	..	..	..	20·60	..	..	..	..	..	13	0	0	Cresco Fertilizers Ltd., Geelong
Moderately Available.																
Dried Blood ..	Fitzroy ..	..	..	13·00	..	..	13·00	..	..	..	..	..	12	10	0	W. Angliss and Co. (Aust.) Pty. Ltd., 42 Bourke-st., Melbourne
„ „ ..	T.B. & S. in diamond—Brooklyn	..	..	12·00	..	..	12·00	..	..	..	..	..	12	0	0	Thos. Borthwick and Sons (A/sia) Ltd., 84 William-st., Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Nitrogenous—Moderately Available—														
Dried Blood—continued.	T.B. & S. in diamond—Portland	..	..	12·00	..	..	12·00	..	..	..	..	..	12 0 0	Thomas Borthwick and Sons (Aust/asia) Ltd., 84 William-street, Melbourne
,, ,, ..	M.C.C. in diamond	..	..	12·00	..	..	12·00	..	..	..	..	..	10 0 0	Melbourne City Council, Town Hall, Melbourne
,, ,, ..	Pannifex's	..	..	12·00	..	..	12·00	..	..	..	..	..	12 10 0	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-street, Melbourne
Blood Manure .	Pentagon ..	..	..	8·13	..	..	8·13	..	2·07	1·13	3·20	..	8 15 0	Mulgrave By-Products Co., North-road, East Oakleigh
,, ,, ..	M.C.C. ..	..	..	8·00	..	..	8.00	..	..	..	..	..	7 0 0	Melbourne City Council, Town Hall, Melbourne
Slowly Available.														
Castor Meal ..	Alba ..	..	..	..	..	.	5·00 (as castor meal)	..	..	2·25	2·25	·75	4 10 0	Lycett Proprietary Ltd., Normanby-road, Montague
,, ,, ..	Sweetsoil ..	..	..	..	..	..	5·00 (as castor meal)	..	..	2·25	2·25	·75	4 5 0	Sweetsoil Lime and Fertilizers Pty. Ltd., 17 Queen-street, Melbourne
,, ,, ..	L.F.X. ..	..	..	..	..	..	5·00 (as castor meal)	..	..	2·25	2·25	·75	4 5 0	Lawford's Fruit Exchange Pty. Ltd., Doncaster
Rape Seed Meal	Alba ..	..	..	..	..	..	5·50 (as rape seed meal)	..	..	1·75	1·75	1·50	5 5 0	Lycett Proprietary Ltd., Normanby-road, Montague
,, ,, ,,	Sweetsoil ..	..	..	..	..	..	5·50 (as rape seed meal)	..	..	1·75	1·75	1·50	5 5 0	Sweetsoil Lime and Fertilizers Pty. Ltd., 17 Queen-street, Melbourne
Wool Waste ..	A.L.T. ..	..	..	..	..	..	3·85 (as wool)	..	..	·70	·70	·31	2 15 0	A. L. Thompson Pty. Ltd., 49 Grant-st., South Melbourne
Flesh, Hoof, and Treated Leather	Pennell's Nitrogenous	..	..	..	..	..	8·00 (as flesh, hoof, and treated leather)	..	..	..	..	..	8 0 0	Est. G. W. Pennell, Burke-st., Braybrook
Flesh, Hoof, and Treated Leather	No. 3 Fertillo	..	..	..	..	..	8·00 (as flesh, hoof, and treated leather)	..	..	..	..	..	8 0 0	Glues and By-Products Pty. Ltd., Melbourne
Phosphatic—Readily Available.														
**Superphosphate 22 per cent.	Cresco ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	6 11 0	Cresco Fertilizers Ltd., Geelong
,, ,,	Sickle in diamond	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	6 11 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Pivot ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	6 11 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Lamaco ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	6 11 0	New Zealand Loan and Mercantile Agency Co. Ltd., 538 Collins-st., Melbourne
,, ,,	Cockbill's ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	6 11 0	W. and J. Cockbill (trading as J. Cockbill), Footscray-rd., Footscray

** The price of superphosphate is subject to the Government subsidy of 25s. per ton. The price per ton of mixtures containing superphosphate is subject to the Government subsidy on their superphosphate content.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*			Where Obtainable.
		As Flesh, Hoof, & Treated Leather.	As Ammonia.	As Bone.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		£.	s.	d.	
		%	%	%	%	%	%	%	%	%	%	%				
Phosphate—Moderately Available.																
Basic Super. ..	Sickle in diamond	..	..	..	..	..	..	..	15·50	3·20	18·70	..	7	2	6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
" "	Pivot ..	..	..	..	..	..	..	..	15·50	3·00	18·50	..	7	2	6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
Super. and Rock Phosphate	Pivot ..	..	..	..	..	..	..	10·00	·50	18·50	29·00	..	7	9	0	" " "
" "	Cresco 50·50 Phosphate	..	..	..	..	..	..	9·16	1·84	17·40	28·40	..	7	9	0	Cresco Fertilizers Ltd., Geelong
" "	Sickle in diamond	..	..	..	..	..	..	10·00	·50	18·50	29·00	..	7	9	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Slowly Available.																
Ground Phosphate	Sickle in diamond (80%)	..	..	..	..	..	..	..	..	36·65	36·65	..	7	12	6	" " "
" "	Pivot (very fine)	..	..	..	..	..	..	..	..	36·50	36·50	..	7	12	6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st. Melbourne
Potassic—Readily Available.																
Sulphate of Potash	Cresco ..	..	..	..	..	..	..	..	..	..	..	48·50	21	10	0	Cresco Fertilizers Ltd., Geelong
" "	Pivot ..	..	..	..	..	..	..	..	..	..	..	48·50	21	10	0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
" "	Sickle in diamond (90%)	..	..	..	..	..	..	..	..	..	..	48·50	21	10	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Muriate of Potash	Sickle in diamond (80%)	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	20	0	0	" " "
" "	Cresco ..	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	20	0	0	Cresco Fertilizers Ltd., Geelong
" "	Pivot ..	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	20	0	0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
MIXED FERTILIZERS. *Containing Nitrogen and Phosphoric Acid—Readily Available.*																
Super. and Ammonia	Cresco (1 and 1)	..	10·30	..	..	..	10·30	10·25	·25	·50	11·00	..	10	10	0	Cresco Fertilizers Ltd., Geelong
" "	Cresco (2 and 1)	..	6·87	..	..	..	6·87	13·66	·34	·66	14·66	..	9	8	6	" " "
" "	Cresco (3 and 1)	..	5·00	..	..	..	5·00	15·40	·30	·80	16·50	..	8	17	0	" " "
" "	Cresco (6 and 1)	..	2·85	..	..	..	2·85	17·48	·42	·85	18·75	..	8	3	0	" " "
" "	Pivot III. ..	..	10·00	..	..	..	10·00	10·20	·20	·50	10·90	..	10	10	0	" " "
" "	Pivot II. (A) ..	..	6·80	..	..	..	6·80	13·60	·30	·60	14·50	..	9	8	6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
" "	Pivot II. ..	..	5·00	..	..	..	5·00	15·30	·30	·80	16·40	..	8	17	0	" " "
" "	Pivot I. ..	..	2·90	..	..	..	2·90	17·40	·40	·80	18·60	..	8	3	0	" " "
	Sickle in diamond (1 and 1)	..	10·30	..	..	..	10·30	10·25	·25	·50	11·00	..	10	10	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*	Where Obtainable.
		As Flesh, Hoof& Treated Leather	As Ammonia.	As Bone.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
MIXED FERTILIZERS. *Containing Nitrogen and Phosphoric Acid—Readily Available*—continued Super. and Ammonia—*continued.*	Sickle in diamond (2 and 1)	..	6·87	..	..	..	6·87	13·66	·34	·66	14·66	..	9 8 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
" "	Sickle in diamond (3 and 1)	..	5·00	..	..	..	5·90	15·40	·30	·80	16·50	..	8 17 0	" " "
" "	Sickle in diamond (6 and 1)	..	2·90	..	..	..	2·90	17·50	·40	·90	18·80	..	8 3 0	" " "
Nitro Superphosphate	Sickle in diamond	..	1·50	..	..	0·50	2·00	16·70	1·10	2·00	19·80	..	8 7 6	" " "
" "	Cresco ..	..	1·50	..	·50	..	2·00	16·39	1·10	1·70	19·19	..	8 7 6	Cresco Fertilizers Ltd., Geelong
Moderately Available. Ammonia and Phosphate	Cresco ..	..	2·00	..	..	..	2·00	8·30	1·60	15·70	25·60	..	8 7 6	" " "
" "	Sickle in diamond	..	2·00	..	..	..	2·00	8·20	·20	18·90	27·30	..	8 7 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Blood, Bone, and Super.	Sickle in diamond	..	..	..	..	2·50	2·50	12·51	1·43	2·96	16·90	..	8 13 6	" " "
" "	Cockbill's ..	..	..	..	5·00	..	5·00	8·00	1·00	3·00	12·00	..	9 10 0	W. and J. Cockbill (trading as J. Cockbill), Footscray-rd., Footscray
Bone and Super.	Sickle in diamond, No. 1	..	..	..	..	2·00	2·00	11·40	3·00	5·30	19·70	..	8 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
" "	Cresco No. 1 ..	..	..	..	2·00	..	2·00	9·50	3·90	3·00	16·40	..	8 10 0	Cresco Fertilizers Ltd., Geelong
Super. and Bone	Cresco No. 2 ..	..	..	..	..	1·00	1·00	16·10	1·10	3·60	20·80	..	8 6 6	" " "
" "	Sickle in diamond, No. 2	..	..	..	..	1·00	1·00	17·00	1·40	1·90	20·30	..	8 6 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
Animal Refuse and Superphosphate	Pennell's Mixed Fertilizer	..	..	..	..	..	6·00 (as bone, meat, and skin)	1·00	1·50	5·50	8·00	..	8 0 0	G. W. Pennell, Braybrook
Flesh, Bone, Hoof, Treated Leather, and Superphosphate	Mixed Fertilizer, Fertillo No. 1	5·00	..	..	..	..	5·00	2·00	3·00	7·00	12·00	..	7 15 0	Glues and By-Products Pty. Ltd., Melbourne
" " "	Mixed Fertilizer, Fertillo No. 2	5·55	..	·20	..	..	5·75	2·00	2·00	6·00	10·00	..	8 0 0	" " "
Blood and Bone, Treated Leather, and Superphosphate	Pannifex's ..	2·50	..	..	2·50	..	5·00	3·00	3·00	4·00	10·00	..	8 0 0	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-street, Melbourne
Blood, Bone, and Treated Leather	Bendigonian mixed fertilizer	1·33 (as treated leather meal)	..	..	3·67	..	5·00	..	4·80	8·40	13·20	..	8 0 0	Bendigo Fertilizer and Wool Co. Pty. Ltd., Charing Cross, Bendigo
Blood and Bone	Sickle in diamond	..	..	..	..	5·00	5·00	..	5·00	9·00	14·00	..	8 0 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
" "	Sickle in diamond (No. 2)	..	..	..	..	7·25	7·25	..	6·00	7·00	13·00	..	9 10 0	" " "
.. "	J. A. Dundas'	..	..	..	..	4·50	4·50	..	7·14	13·61	20·75	..	8 10 0	J. A. Dundas, Dynon-rd., Footscray
.. "	Corio ..	..	..	..	4·00	..	4·00	..	6·00	8·00	14·00	..	7 0 0	The Corio Trading Co. Pty. Ltd., 164 Moorabool-street, Geelong

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*	Where Obtainable.
		As Flesh, Hoof, and Treated Leather.	As Ammonia.	As Bone.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
MIXED FERTILIZERS.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Containing Nitrogen and Phosphoric Acid—Moderately Available—continued.	Cockbill's ..	..	..	..	..	7·50	7·50	..	1·50	6·00	7·50	..	9 10 0	W. and J. Cockbill (trading as J. Cockbill), Footscray-rd., Footscray
" "	Fitzroy in diamond	..	..	..	5·50	..	5·50	..	8·00	8·00	16·00	..	7 15 0	W. Angliss and Co. (Aust.) Pty. Ltd., 42 Bourke-st., Melbourne
" "	Premier ..	..	..	..	..	7·00	7·00	..	6·50	5·50	12·00	..	9 5 0	" " "
" "	Murray ..	..	..	..	5·25	..	5·25	..	7·00	5·00	12·00	..	7 10 0	Western and Murray Co-operative Bacon and Meat Packing Co. Ltd., 522 Flinders-lane, Melbourne
" "	Pridham's ..	..	..	..	5·10	..	5·10	..	6·00	8·00	14·00	..	8 0 0	W. Pridham Pty. Ltd. Evans-st., Braybrook
" "	Ibis	..	..	..	..	5·50	5·50	..	5·25	5·00	10·25	..	7 10 0	Ficken, Halliday and McClelland Pty. Ltd., 634 Bourke-st., Melbourne
" "	P.M. ..	..	..	..	..	7·00	7·00	..	6·31	5·69	12·00	..	9 0 0	J. Kitchen and Sons Pty. Ltd., Ingles-st., Port Melbourne
" "	Solo ..	..	..	..	..	7·00	7·00	..	4·25	10·75	15·00	..	9 0 0	" " "
" "	Cockatoo ..	..	..	..	4·56	..	4·56	..	5·90	5·88	11·78	..	6 10 0	R. Fordham, Cressy-rd. Camperdown
" "	Echuca ..	..	..	..	4·66	..	4·66	..	6·78	7·26	14·04	..	7 10 0	Echuca Freezing Works, Goulburn-rd., Echuca East
" "	Champion ..	..	..	..	6·00	..	6·00	..	6·00	6·00	12·00	..	8 10 0	Sims Cooper (Freezing Works) Pty. Ltd., Henty House, 499 Little Collins-street, Melbourne
" "	Fitzgerald's ..	..	..	..	5·00	..	5·00	..	8·50	6·50	15·00	..	7 10 0	P. Fitzgerald and Sons, Oakleigh
" "	T.B. and S. in diamond (Portland)	..	..	..	5·75	..	5·75	..	7·00	5·00	12·00	..	8 0 0	Thos. Borthwick and Sons (A'asia) Ltd., 84 William-st., Melbourne
" "	T.B. and S. in diamond No. 1 (Brooklyn)	..	..	..	5·75	..	5·75	..	7·00	5·00	12·00	..	8 0 0	" " "
" "	Apex ..	..	..	..	..	5·00	5·00	..	3·00	12·00	15·00	..	8 0 0	North-Eastern Bone Products, Wangaratta
" "	Pannifex's No. 1	..	..	..	..	7·00	7·00	..	6·00	8·00	14·00	..	9 0 0	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-st., Melbourne
" "	Pannifex's No. 2	..	..	..	..	7·00	7·00	..	6·31	5·69	12·00	..	9 0 0	" " "
" "	Pannifex's No. 3	..	..	..	..	5·00	5·00	..	6·00	8·00	14·00	..	8 5 0	" " "
" "	Pannifex's No. 4	..	..	..	5·00	..	5·00	..	4·00	6·00	10·00	..	8 5 0	" " "
" "	Sayer ..	..	..	..	3·57	..	3·57	..	8·58	10·31	18·89	..	8 0 0	Sayer Co. (Aust.) Pty. Ltd., Laverton
" "	Valley ..	..	..	..	..	5·09	5·09	..	3·44	4·23	7·67	..	6 10 0	Goulburn Valley Freezing Works, Shepparton
" "	M.S.C. ..	..	..	..	6·25	..	6·25	..	4·50	6·25	10·75	..	8 12 7	Mildura Shire Council, Mildura
" "	Arch No. 1 ..	..	..	..	7·00	..	7·00	..	6·00	3·00	9·00	..	8 0 0	Amalgamated Freezing Co. (Vic.) Pty. Ltd., 54 Market-st., Melbourne
"	Arch No. 2 ..	..	..	..	7·00	..	7·00	..	5·00	3·00	8·00	..	8 0 0	" " "

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Unspecified.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Flesh, Hoof, and Treated Leather.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
MIXED FERTILIZERS. *Containing Nitrogen and Phosphoric Acid—Moderately Available*—continued.														
Animal Fertilizer	Fitzgerald's ..	..	..	..	..	3·70	3·70	..	9·50	9·50	19·00	..	7 10 0	P. Fitzgerald and Sons, Warrigal-rd., Oakleigh
,, ,,	A. and A. Surprise	..	..	..	..	5·00	5·00	..	4·00	10·00	14·00	..	8 10 0	G. W. Pennell, Burke-st., Braybrook
Bone Fertilizer	Newnham's ..	..	..	..	..	..	2·28 (as bone)	..	6·86	16·72	23·58	..	5 10 0	Newnham Pty. Ltd., Box 8, P.O., Sale
Containing Phosphoric Acid and Potash—Readily Available.														
Super. and Potash	Sickle in diamond (S.P. Super. Potash)	..	..	..	..	..	..	15·40	·30	·80	16·50	12·50 (as muriate)	10 11 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Pivot IX. ..	..	..	..	..	..	..	15·40	·30	·80	16·50	12·50 (as muriate)	10 11 6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Cresco (3 and 1)	..	..	..	..	..	..	15·38	·37	·75	16·50	12·5 (as muriate)	10 11 6	Cresco Fertilizers Ltd., Geelong
COMPLETE FERTILIZERS. *Containing Nitrogen, Phosphoric Acid, and Potash Readily Available*—														
Complete Manure	Sickle, No. 1 ..	..	1·00	..	..	1·40	2·40	12·50	1·70	2·10	16·30	5·00	10 2 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melbourne
,, ,,	Sickle in diamond, No. 2	..	1·00	..	..	1·00	2·00	14·40	1·30	1·60	17·30	4·20	10 1 0	,, ,, ,,
,, ,,	Sickle in diamond (Market Garden)	..	1·70	..	..	1·50	3·20	12·40	2·00	2·70	17·10	2·42	10 1 0	,, ,, ,,
,, ,,	Sickle in diamond (A) (5.1.1.)	..	2·90	..	..	..	2·90	14·60	·40	·70	15·70	6·90	10 7 6	,, ,, ,,
,, ,,	Sickle in diamond (B) (5.2.1.)	..	5·00	..	..	..	5·00	12·80	·30	·60	13·70	6·00	11 0 0	,, ,, ,,
,, ,,	Sickle in diamond (C) (4.4.1.)	..	9·15	..	..	..	9·15	9·11	·22	·44	9·77	5·39	11 19 0	,, ,, ,,
,, ,,	Pivot IV. ..	..	2·90	..	..	..	2·90	14·30	·30	·70	15·30	6·90	10 7 6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melbourne
,, ,,	Pivot VI. ..	..	9·10	..	..	..	9·10	9·10	·20	·40	9·70	5·30	11 19 0	,, ,, ,,
,, ,,	Cresco No. 1 ..	..	1·00	..	1·40	..	2·40	11·25	2·00	4·50	17·75	5·00	10 2 0	Cresco Fertilizers Ltd., Geelong
,, ,,	Cresco (Market Garden)	..	1·50	..	1·56	..	3·06	11·65	1·49	3·26	16·40	2·42	10 1 0	,, ,, ,,
,, ,,	Cresco, No. 2 ..	..	9·15	..	..	..	9·15	9·11	·22	·44	9·77	5·39	11 19 0	,, ,, ,,
,, ,,	Cresco, No. 3 ..	..	5·15	..	..	..	5·15	12·81	·31	·63	13·75	6·06	11 0 0	,, ,, ,,
,, ,,	Rapid Grower	..	2·26	..	(as sheep manure) 42	1·32	4·00	7·37	1·60	2·03	11·00	1·65	8 15 0	Horticultural Industries Pty. Ltd., 67 Burnley-street, Richmond

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1942—*continued.*

Bonedust.	Brand.	Nitrogen.	Phosphoric Acid.	Mechanical Condition.		Price asked per ton.*	Where Obtainable.
				Fine Bone.	Coarse Bone.		
		%	%	%	%	£ s. d.	
Bonedust ..	Apex ..	3·25	20·00	50·0	50·0	7 10 0	North-Eastern Bone Products, Wangaratta
,, ..	Mount Clear ..	3·00	19·00	50·0	50·0	8 0 0	Bailey Bros., 155 Main-rd., Ballarat
,, ..	Pannifex's ..	3·50	19·00	50·0	50·0	8 10 0	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-stree, Melbourne

* F.O.R. at Melbourne or Railway Station nearest place of manufacture.

W. R. JEWELL, M.Sc., F.I.C.,
Chemist for Agriculture.

Melbourne, 31st December, 1941.

Tubercle Free Herds

The following herds have been declared free of tuberculosis under the scheme conducted by the Department of Agriculture. Under this scheme a tuberculosis-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Accredited Tubercle Free Herds.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp...	Ballarat	69	Onley, W. H. ..	"Glenholme," Caldermeade	59
Banyule Stud Pty. Ltd.	Heidelberg	40			
Dennis, Mrs. A. A. ..	Frankston	33	Payne, A. E. T. ..	"Yarra View," Lilydale	77
Dookie Agricultural College	Dookie	77			
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15	Payne, T. E. N. ..	"Woodburn," Kilmore	53
Geelong Grammar School	Corio	58	Powell, T. S. ..	"Carellen," Mansfield	43
Gorman, A. W. ..	"Catheart," Alexandra	61	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield ..	39
Henderson, J. L. and E. I.	Wangaratta ..	95	Samuel, Misses G. and E.	Lang Lang ..	48
Holloway, R. W. ..	Caldermeade ..	70	School of Horticulture..	Burnley	9
Lawrence, P. H. ..	"Rainga," Tarrawarra	72	State Experiment Farm	Rutherglen ..	51
Longerenong Agricultural College	Dooen	47	State Research Farm ..	Werribee	211
			Wells, W. G. ..	Caldermeade ..	62

In addition to the above-mentioned herds there are 142 commercial dairy herds containing 5,298 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactons at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 80 herds in which 4,176 head of cattle have passed one test, and may be considered, therefore to be in process of becoming tuberculosis-free herds.

Contents.

MARCH, 1942

		PAGE
Pasture Investigations—Results of 1940 Trials	*R. L. Twentyman, B.Agr.Sc.*	109
Fodder Conservation—Competition at Yea	*W. D. Andrew, M.Agr.Sc.*	119
Wartime Vegetable Growing at Home		123
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	126
Shortage of Materials for Worm Drenches		130
Rutherglen Crop Competition	*J. A. Morrow, B.Agr.Sc.*	131
Marketing of Primary Products—Activities of Boards		134
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	140
Garden Notes	*J. L. Provan, B.Agr.Sc.*	141
Wimmera Wheat Crop Championship	*A. B. Hackwell, B.Agr.Sc.*	143
Irrigated Pastures—Trials in Goulburn Valley and Northern Irrigation Areas	*G. B. Rayner, B.Agr.Sc.*	151
Blind or Stomach Staggers of Horses		153
Standard Herd Records—Quarter ended 31st December, 1941		154

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

For Cooler Smoking . . . Finer Flavour

IN THE SMART GREEN & GOLD PACKS . . . .

also . . . FINE CUT and READY RUBBED

850-10.40

HAVELOCK
Flake Cut Tobacco

INDEX TO ADVERTISEMENTS

FRONT SECTION

Cooper Engineering Co. Pty. Ltd. ... opp. p. 126
Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) ... . opp. p. 117
Goodyear Tractor Tyres ... ... opp. p. 116
H. V. McKay Massey Harris Pty. Ltd. ... iii
International Harvester Coy. of Australia Pty. Ltd. v
Law Somner Pty. Ltd. (Seeds) vi
Leggo, Victor, & Farmers Ltd. .. inside cover
Trewhella Bros. Pty. Ltd. iv
Vacuum Oil Co. Pty. Ltd. .. opp. p. 127
W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ii
Victorian Railways iv

BACK SECTION

A. H. McDonald & Co. Pty. Ltd. (Vetamac) ... ... opp. p. 143
Ajax Insurance Company Ltd. ... outside cover
Australian Cement Ltd. .. ... inside cover
Bayer Pharma Ltd (Ceresan) ... opp p. 143
Cameron & Sutherland Pty. Ltd. ... opp. p. 152
Cockbill, J. vii
Elder Smith & Co. Ltd. (Esa Bluestone) ... vii
Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 142
Lysaght Bros. & Co. Pty. Ltd. vii
Rylands Bros. (Aust.) Pty. Ltd. .. opp. p. 153
State Savings Bank ... ... opp. p. 153
Victoria Insurance Co. Ltd. ... opp. p. 152

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Journal of Agriculture, Victoria- March, 1942.

PASTURE INVESTIGATIONS

Extracts from the Ninth Annual Report of the Experimental Pasture Work conducted by the Department of Agriculture for the Victorian Pasture Improvement League

By R. L. TWENTYMAN, B.Agr.Sc., Agrostologist

THE experimental pasture work conducted by the Department of Agriculture under arrangement with the Victorian Pasture Improvement League was begun in 1932, and this ninth report gives the results of experiments measured or observed during 1940, and a summary of the results recorded on individual plots during the earlier years. For more complete details of the results of the previous years, the annual reports issued early in years 1933–40 should be perused.

Scope and Nature of Work.

The work was undertaken to study the nature and seasonal growth of the various pasture types throughout Victoria, and to investigate the possibility of their improvement, or the establishment of pastures of better species and the maintenance of the improved swards.

At the commencement of the work a chain of plots was established throughout Gippsland and the Western District, but later this work was extended to the North-East, and to the irrigated pastures of the North. The experiments have been conducted on a wide range of pasture types, and have furnished reliable information as to the improvement of most of the types of pasture likely to be encountered throughout the State.

The figures quoted in this report are the results of actual measurements made of the pasture growth produced upon variously fertilized plots. The measurements were made by means of cutting strips by the use of motor grass mowers and weighing the produce at intervals throughout the year.

In order to serve as a check on the effect of mowing, larger but similarly fertilized areas were fenced off and subjected to grazing. It was not found possible, to obtain by means of the grazing stock, a satisfactory measure of the relative amounts of feed on each of these areas, but these grazing areas have provided a useful comparison with the manurial trials that have been regularly mown.

On the Pilot plots, and the pasture mixture and species trials, observational records only have been made.

Victorian Pastures.

While Victorian pastures differ greatly in composition, vigour of growth, and the nature of the weed species present, they possess some important features in common. Seasonal rainfall is the most important factor limiting growth on Victorian pastures, and although the winter may often be too wet, the seasons are usually too dry, and it is only in years of abundant rainfall that prolific growth is made. The unimproved pastures which consisted of the persistent perennial native species, wallaby grass, kangaroo grass, and the love grasses, &c., made most of their growth in the late spring and summer, but were almost dormant during the winter and early spring. Such species were unable to grow at the time of the year when soil moisture was almost invariably sufficient to permit growth to occur. It was obvious therefore, that as drought limited growth during so much of the year, and since no species or manurial treatment was capable of averting the growth suppressing influence of drought, that any successful scheme of pasture improvement would have to be directed towards stimulating growth during periods of the year when drought would probably not be of major importance. It is for this reason that top-dressing with superphosphate and the introduction of subterranean clover have proved so completely successful in pasture improvement in Victoria. The superphosphate encouraged the development of favorable soil conditions for growth during the winter and early spring, while

The response obtained from the use of superphosphate on a Western District pasture plot is clearly shown.

Baling a crop of oaten and grass hay.

subterranean clover provided a plant capable of making vigorous growth during this period.

Compared with the results achieved by the use of subterranean clover and superphosphate, most other methods of pasture improvement appear to be of insignificant value. It is therefore understandable that the farmer having achieved so readily such spectacular initial results in the improvement of his pastures, should believe that all he need do from there on, is to confine his efforts to the "subterranean clover and superphosphate" policy, now popularly referred to as "sub. and super.," and all will be well. "Sub. and super." will probably continue to be the basis of most pasture improvement work in Victoria, but in many areas the farmer having once started pasture improvement work cannot leave it at that. By top-dressing and the introduction of subterranean clover he has put in motion a train of events which from there on he must either control or stand aside and allow changes to proceed undirected.

In Victoria, providing the district has a reasonable rainfall, the first step in pasture improvement is simple, for "sub. and super." almost invariably effects a marked improvement in growth. The results of the experimental plots have confirmed this fact and have shown that it is only in rare instances that lime or any fertilizer other than superphosphate is required. But the pasture improvement does not proceed far before the individual differences of the various pastures and districts begin to assert themselves. In some districts with good rainfall and where perennial rye grass persists together with the clovers, the pastures should become better and better with each succeeding top-dressing.

But this fortunate state of affairs is by no means general, and during the course of this experimental work ample evidence has been obtained to indicate that unless the improved pastures are properly managed, nothing like the maximum possible advantages from them will be secured.

Therefore while "sub. and super." can confidently be recommeded as the most effective means for the initial improvement of most Victorian pastures, the subsequent treatment of the improved pastures should be varied according to the climatic and soil fertility conditions, and the nature of the other species growing in association with the subterranean clover. In the drier districts the fluctuations in yearly rainfall cause large variations in seasonal and yearly production, and the conservation of surplus spring growth to provide feed for future lean periods is essential.

In the drier areas or on well drained "warm" soils which provide good winter growing conditions care should be taken that the increased fertility does not result in the pasture being invaded by undesirable annual grasses, and here useful species capable of utilizing the improved soil conditions should be introduced. In some cases the volunteer growth of undesirable grasses may be checked

by cutting early in the spring for silage, and if conditions are not favorable for the introduction of perennial rye grass then either the annual Wimmera rye grass or the drought resistant *phalaris tuberosa* should be used. On such soils there does not appear to be much necessity to guard against soil fertility exhaustion, and trouble is more likely to occur through soil fertility conditions becoming too high, rather than too low.

On the poorer soils in the wetter districts, however, the problem of pasture development takes a very different course and here every effort must be made to build up soil fertility while the species can almost be left to take care of themselves.

On such soils every effort must be made to guard against a soil potash deficiency being brought about, and the too frequent cutting for grass hay or the failure to return animal droppings to the pasture must be guarded against.

Once a potash deficiency has developed nothing other than a potash fertilizer will correct the deficiency, but in view of the high cost of such treatment it is most desirable that this condition should be prevented from developing.

It must be admitted that the method of cutting the mowing manurial trials aggravates and accelerates the exhaustion of soil potash, but very marked potash deficiencies recorded on normally grazed pastures at such widely separated areas as Colac, Cobden, Warragul, and Lilydale, suggest that much of southern Victoria may suffer from this trouble if precautions are not taken to prevent its development.

It should not be regarded as any reflection on the real worth of top-dressing with superphosphate to have to point out that improved pastures require appropriate management. Problems which did not appear so long as the land was left in unimproved native pasture arise with the improved pastures, but such disadvantages are usually small compared with the very real benefits resulting from pasture top-dressing. It will readily be appreciated, if as is often the case, the carrying capacity of land is increased four-fold by pasture improvement, that very considerable disadvantages could be experienced without detracting much from the usefulness of the method.

Amidst all the present talk of soil erosion, soil impoverishment, the encroachment of weeds, and the various forms of land deterioration, pasture improvement is conspicuous as the one positive means of "building up" and is the first real contribution made to offset the long continued programme of land exploitation in this State.

Well-grassed slopes are protected against erosion.

Summary of Results for 1940.

Dry weather was experienced during the year, and the yields of produce obtained from the various plots were much lower than normal. As has been usual in the past, the manurial responses were most conspicuous in the early spring. On the dry land pastures, this early spring stimulus to growth seems to be the characteristic response of all pastures, be the stimulating fertilizer, nitrogen, phosphate, potash, or lime. On most plots the stimulus to growth has been achieved by the use of superphosphate only, but on some plots further increased growth has been obtained by the use of potash in addition to the superphosphate. The good responses to lime are still mainly restricted to the North Mirboo and Lilydale plots, but evidence has been obtained on some of the Western District plots to suggest that providing the soil is amply provided with superphosphate and potash, that lime in addition might then be useful.

Curiously enough it has been under the very condition that the most persistent claims for lime were made, that in these trials it has been found least effective. On pastures where an acute potash deficiency has been recorded, and where the response to superphosphate alone has been found to be very poor, the addition of lime to plots receiving superphosphate only has been ineffective in stimulating growth. Such results suggest that the lime has little effect in releasing potash in these soils, and making it available to the pasture.

Where sulphate of ammonia was applied to the pastures it was found to provide a very temporary stimulus only, and a subsequent long continued period of depressed growth. Its ultimate effect on the pastures has been so consistently adverse that it was omitted from the new plots established in the North-East and Lilydale, and more recently has been omitted from the newer Gippsland mowing trials.

A discussion of the effects of the various artificial fertilizers was given in considerable detail in previous reports, and seeing that no material changes were recorded in their responses last year, it is not proposed to discuss at length this aspect of the work in this report.

Growth and Weather Conditions during 1940.

Following the two very dry years of 1937 and 1938, an unusually wet and prolific year was experienced in 1939 and it was generally considered that a succession of favorable seasons could be expected. Such proved to be far from the case, and in 1940 another disastrously dry year was experienced. Fortunately, the prolific spring of 1939 had enabled a large reserve of grass hay to be accumulated, and although this mainly consisted of rank growth of poor quality, it proved most valuable in maintaining the stock during the winter and early spring of 1940. Late in the spring the feed position was relieved by an unusually cool and wet November, and after a hot dry December abnormal heavy summer rains encouraged unusually good growth which provided timely relief early in 1941.

The pastures of 1940 were notable for the small proportion of subterranean clover in them. In 1939 this clover had grown with extraordinary vigour and was frequently found growing most prolifically on pastures which despite top-dressing had previously only shown a meagre growth of subterranean clover. However, in the following year of 1940 the reverse was the case, and on most pastures subterranean clover was only present in very small amount.

PASTURE IMPROVEMENT IN THE WESTERN DISTRICT.

The early results of the trials soon confirmed the general experience of farmers throughout the Western District that this area is very responsive to pasture improvement, but subsequent developments indicate that the maintenance of these pastures in an improved condition will present more problems than their mere initial improvement.

The area enjoys a good average rainfall, there are extensive areas of from moderately good to rich soil, and climatic conditions are favorable for the persistence of perennial rye grass and subterranean clover. Much of the Western District naturally provided good pasture, but there was a much larger area of lighter carrying country on much of which the grazing capacity has since been increased fourfold and more, by the adoption of pasture improvement methods.

Most of this improvement has been achieved by means of top-dressing with superphosphate and the introduction of subterranean clover, and in some areas perennial rye grass has also

A deteriorated, grassy pasture.

been useful. Having obtained improved pastures their maintenance in an improved state must be seriously considered.

The original native pastures consisting mainly of wallaby grass with kangaroo grass and other common native grasses in lesser amount, were very easy to maintain. They withstood overstocking and understocking quite well, and resisted the incoming of other species, and could be regarded as the stable pasture population of the area. So long as no major alteration was made to the fertility of the soil these species persisted, and even after their apparent total destruction by ploughing and cropping, they slowly but surely came back.

The main underlying principle in pasture improvement in the Western District is to so improve soil fertility by means of superphosphate, that winter and early spring growing species can flourish and take advantage of the favorable soil moisture conditions that usually occur at this time of the year. To achieve this, superphosphate is applied, and subterranean clover seed sown, sometimes with the addition of perennial rye or Wimmera rye grass. As a result, strong pasture growth is produced in the early spring, and the native grasses which usually made most growth in the late spring and summer are at a disadvantage.

At the end of the season the annual clover dies off and may leave large bare patches during the late summer. As a result of these bare patches and the fact that soil conditions have been made favorable for winter growth, other weeds and grasses soon creep in. It is then that the difficulties of the maintenance of improved pastures become apparent.

In many districts on the lighter soils it is very easy to bring about the initial improvement of the pasture, but the now widespread occurrence of cape weed and Yorkshire fog grass over much of the Western District, illustrates the little attention that many farmers have given to the subsequent development of the pasture. The direction of this subsequent development of the pasture largely depends on the nature of the soil and the rainfall of the area.

The trials have clearly shown that pasture growth is greatly influenced by seasonal conditions, rainfall being the most important controlling factor. But in addition, soil fertility largely determines the amount of growth that will be made by a pasture in any particular year. Unfortunately, it is not only desirable pasture plants that flourish under high soil fertility conditions, and it is frequently found that rich land tends to produce a weedy pasture growth. On the richer soils, increased soil fertility coupled with a bare condition of the soil surface in the late summer, usually results in a profuse growth of winter weeds, and it is this condition that has resulted in the great increase of cape weed, marshmallows, and undesirable annual grasses that has occurred in recent years. The severe drought and hot summers of 1937 and 1938 destroyed much of the perennial rye grass where pastures were growing on loamy soils, and on many of these pastures the perennial rye grass has not re-established, and cape weed is still troublesome.

In the northern portions of the State climatic conditions normally favour the growth of annual species and if these are further encouraged by the use of superphosphate, the more desirable perennial grasses will have difficulty in surviving. In the Western District the growth of the annual species is usually checked by cold wet winter conditions, and the perennial species compete against the annual species under more favorable conditions. However, in unusually hot and dry

seasons it has been found that the perennial species may not survive the summer, and the bare patches left may in the subsequent autumn enable the annual weed species to rapidly establish in the pasture.

It is usually on the lighter sandy soils that the death of the perennial species and the encroachment of the annual species has been most troublesome, but in the summer of 1938-9, much of the perennial rye failed to survive even on the heavier loams. On such land cape weed, silver grass, and soft brome have since become strongly established.

In the wetter areas on poorer soils high fertility demanding weeds are not troublesome and here the repeated applications of a fertilizer containing phosphate only, is liable to result in the soil becoming deficient in potash, which condition is usually reflected in a marked weakening in the clover and perennial rye grass, and an increased proportion of Yorkshire fog, sweet vernal, sorrel and flat weed.

Pasture improvement in the Western District depends mainly on top-dressing with superphosphate and the introduction of subterranean clover, but it is essential that a satisfactory composition of the pasture be maintained, and that the increased soil fertility is not spent in growing useless grasses and weeds.

Care should be taken that the soil's reserve of potash is not unduly depleted, either by repeated hay cutting, or by the non return of dung to the pastures, as the trials have shown that the margin of available potash in most Western District soils is low.

The newer mowing plots established at Cobden and Colac, to investigate the extent of the pasture liable to suffer from potash deficiency have confirmed and emphasized the results of the earlier trials. All of these plots have shown large responses to potash, the relative response to superphosphate or potash depending on how much superphosphate had previously been applied to the land and the extent to which grass hay cutting had been practised. These trials indicate that once the soil potash has been depleted nothing other than potash will make up the deficiency, and the use of superphosphate, lime, or nitrogen or any combination of them, is quite ineffective.

Results of Western District Major Plots

The following tables show the total annual yields expressed as hundredweights of greenstuff per acre that have been recorded on the mowing manurial trials. On the Major plots each manurial treatment is replicated six times, but on the "new mowing" areas three replicates only are used.

Details of the yields obtained in the earlier years are to be found in the previous annual reports.

Abbreviations Used in Yield Tables from Mowing Trials.

Nil	= no manure.
P^2	= superphosphate 2 cwt. per acre.
P^2N	= superphosphate 2 cwt. + sulphate of ammonia 1 cwt.
$P^2N.Ca$	= superphosphate 2 cwt. + sulphate of ammonia 1 cwt. + lime 1 ton per acre, 1932.
$P^2N.K.$	= superphosphate 2 cwt. + sulphate of ammonia 1 cwt. + muriate of potash 1 cwt.
P^3	= superphosphate 2 cwt. autumn + 1 cwt. spring.
K	= potash 1 cwt.

In the Western District, major trials were established at Coragulac, Larpent, Glenormiston North, Cobrico, and Cudgee, while observation pilot plots have been conducted throughout the whole area. An extension of the mowing trials was later made in the Cobden and Colac districts in order to determine how widespread the possible potash deficiency was.

The mowing trials were conducted in districts with an average rainfall of from 27 to 29 inches per year, and while they were all subjected to approximately the same climatic conditions, variations in soil type resulted in considerable differences in the characteristics of the pastures.

The **Coragulac** plot which was conducted for only four years was situated on the deep rich volcanic clay soil, of the type so frequently used for onion growing. Artificial fertilizers only effected a small increase in pasture growth here, and it was concluded that for pasture purposes the soil was so well supplied with plant nutrients that artificial manures were hardly needed. Perennial rye

grass was very persistent on this type of soil and checked the development of subterranean clover, and this absence of an associate clover resulted in lack of vigour of the perennial rye grass pasture, particularly in the winter and early spring. It was concluded that this soil was better suited for cultivation than for permanent pasture, but if pasture was required then temporary pastures should be more productive than permanent ones.

TABLE 1.—MANURIAL TRIALS, CORAGULAC.—(E. W. MARTIN).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	119	123	146	146	152	144
1933 ..	89	117	121	120	121	129
1934 ..	193	228	211	204	191	220
1935 ..	138	176	180	172	169	169
To 6.10.36	72	81	90	83	85	74

On the species trial section of this plot very promising results were obtained with *phalaris tuberosa* and both this species and cocksfoot grew much better in association with subterranean clover than did the perennial rye grass alone.

The **Glenormiston North** plot was established on the edge of rich volcanic land and the pasture consisted of a dense productive sward of perennial rye and subterranean clover.

TABLE 2.—MANURIAL TRIALS, GLENORMISTON NORTH.—(K. ATKINS).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	155	174	176	187	176	177
1933 ..	115	134	137	145	143	134
1934 ..	257	336	267	279	278	339
1935 ..	243	284	242	250	303	281
1936 ..	166	222	217	214	274	224
1937 ..	120	153	153	154	198	160
1938 ..	44	64	70	77	94	68
1939 ..	172	230	217	224	282	231
1940 ..	52	64	75	76	105	64

This pasture had previously received several top-dressings with superphosphate and the plot has only shown a moderate response to superphosphate. Both lime and sulphate of ammonia have been ineffective in stimulating growth on this trial. In the first years, potash did not show any material response, but in the more recent years a good response has been recorded. In the Western District it has been found that the lighter the soil the sooner it shows evidence of potash deficiency when subjected to repeated cutting, and that the stronger soils similar to that at Glenormiston North, will withstand this ill-treatment for a considerable time before showing signs of weakening.

The **Cudgee** plot is situated on a soil typical of much of the light sandy area in the southern western district, which previous to top-dressing was regarded as unsound for stock and which was very unproductive.

TABLE 3.—MANURIAL TRIALS, CUDGEE.—(E. R. MURFITT).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	77	130	137	118	132	136
1933 ..	88	138	146	146	170	143
1934 ..	115	225	159	158	183	222
1935 ..	119	136	134	139	211	147
1936 ..	81	106	115	119	194	111
1937 ..	50	57	68	71	114	57
1938 ..	27	36	44	45	65	34
1939 ..	76	88	73	86	148	68
1940 ..	25	27	35	35	57	27

The rainfall of this area is good, and the fine sandy soil naturally deficient in plant food gives a striking response to superphosphate. As the figures show the response on this plot to superphosphate was excellent in the first years, but this has since declined, and now except for where potash is applied the response to superphosphate alone is very poor.

The results illustrate the necessity for conserving soil potash on this type of soil if pasture production is to be maintained.

Cape weed is very persistent in this district, being favoured by the light textured soil, and the fact that perennial rye grass has rather a precarious existence over the summer period, and that the pastures on loose soil suffer from excessive trampling during the summer.

The **Larpent** (Colac) pasture plot is also situated on a sandy loam soil and although it gave a good response to superphosphate in

the first years, the response subsequently declined and the growth is now satisfactory only where potash is applied in addition to the phosphate. As at Cudgee, cape weed is a serious pest on this plot, and unless care is taken to preserve the perennial elements of the sward the cape weed is liable to completely dominate the pasture. As might be expected from the usual behaviour of cape weed, it is the most highly fertilized swards which suffer most seriously once the swards become open to invasion.

The species trial area on this plot made extraordinary growth during the first year after breaking up and sowing down, but the subsequent growth has been poor, and despite the weakness of most of the grasses, subterranean clover has made very little headway. Although this species section has been regularly top-dressed with superphosphate, it was not until a cross strip of potash was recently applied to the area that the clover has made any material headway.

Early in 1939 portion of this plot was given a dressing of potash bearing flue dust from the Geelong Cement Works, and this has since given a remarkable stimulus to the growth of clover on the treated section.

TABLE 4.—MANURIAL TRIALS, LARPENT.—(J. J. ROGERS).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	98	160	168	176	194	174
1933 ..	88	143	162	171	189	146
1934 ..	124	185	173	175	232	191
1935 ..	115	111	119	135	237	113
1936 ..	104	124	126	133	233	127
1937 ..	64	60	78	79	116	57
1938 ..	33	36	45	48	65	33
1939 ..	98	103	113	117	154	97
1940 ..	30	33	44	43	80	38

The Cobrico plot differs from the other Western District major plots in possessing a fair proportion of white clover in the sward. As a result of very wet conditions during the winter, the usual winter growing annual weeds and grasses are not very prominent, and the chief trouble is experienced with Yorkshire fog and sweet vernal grass. Previous to the establishment of the trial this pasture had been top-dressed with superphosphate for several years, and had reached a stage when the owner did not consider that the response to superphosphate was still satisfactory. The mowing trial soon showed that the response to superphosphate was only small but that a very substantial response could be obtained by the use of potash in addition. This good response to potash and superphosphate has been sustained, and it is only where potash has been applied to the plot that the growth has been satisfactory.

TABLE 5.—MANURIAL TRIALS, COBRICO.—(N. MASKELL).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	133	164	155	157	193	145
1933 ..	81	108	136	133	174	110
1934 ..	121	167	155	163	218	176
1935 ..	87	107	108	120	232	111
1936 ..	85	101	104	110	226	103
1937 ..	85	105	108	119	175	113
1938 ..	35	53	62	68	92	59
1939 ..	71	92	103	111	190	97
1940 ..	28	37	46	49	104	39

NEW SERIES MOWING TRIALS.—WESTERN DISTRICT.

The early results of the Western District major plots showed unexpectedly large responses to potash at Cobden and Colac. In order to ascertain the extent of the possible soil potash deficiency in these districts, several new mowing trials were commenced in 1935 on pastures suspected of being deficient in potash.

While these new trials have all shown a very marked response where both superphosphate and potash have been applied, there has been a good deal of variation in the extent and nature of the response on individual plots. Though certain districts and soil types may be liable to potash deficiency, this condition appears to be associated more with the management of the pasture and the previous treatment of the soil than with the actual type of soil.

Plots established on pastures not previously top-dressed showed at first quite a good response to superphosphate and a further moderate response to dressings of potash. Those plots established on pastures repeatedly

The addition of potash to this sward has greatly improved growth. Note the density of clover.

top-dressed with superphosphate showed only a small response to this material, but a very marked response when both superphosphate and potash were applied. As the work on these mowing manurial trials proceeded it was found that on all, the response to superphosphate alone declined, while the response to "superphosphate and potash" increased. It has usually been found that top-dressing with potash alone is not sufficient to stimulate growth, and that both superphosphate and potash must be used. Neither lime nor sulphate of ammonia have shown any ability to promote extra growth when potash has become the growth limiting factor.

In considering the results of these mowing manurial trials it must be remembered that the clippings from the plots are entirely removed and that there is no normal return to the soil of the plant residues in the form of dung or urine. Such methods, therefore, soon accentuate any soil potash deficiency, but the fact that a response to potash is so readily obtained should serve as a warning that the normal soil potash supply is not unlimited, and that it may quite readily be exhausted if the pastures are not properly managed.

Table 6 shows a typical response on a pasture that had previously received very little superphosphate. For the first few years there was a good response to superphosphate on this plot, and a further good response to potash, but while "superphosphate, plus potash" still gives a good response, the response on the superphosphate only strips is now very poor.

TABLE 6.—MANURIAL TRIALS, COBDEN.—(J. ROBERTS).

Yield in cwts. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2K.	P2Ca.	P2KCa.	P2NK.	K.
Spring—1935 Year—	91	128	164	118	155	127	96
1936	104	200	266	201	275	258	115
1937	78	106	186	123	201	172	102
1938	45	68	132	81	142	132	51
1939	81	123	271	123	275	234	86
1940	33	38	85	46	95	95	41

Table 7 shows the manurial response of a pasture which, though previously not top-dressed, was quite a good productive sward. In this case there has been a good initial response to superphosphate, and this has been well sustained. It will be noticed however,

[*Continued on page* 144.

Fodder Conservation

Competition at Yea

Report of the Judge: W. D. ANDREW, M.Agr.Sc., Assistant Agrostologist

Fodder reserves of oaten and meadow hay on the property of Mr. G. Brown, winner of the competition.

THIS year, as a result of financial support having been received from the Victorian Government and the Commonwealth Fodder Conservation Board, the Royal Agricultural Society of Victoria has been able to extend the scope of Fodder Conservation Competitions to include group championships. Thirty-one societies having agricultural interests entered the competition. At Yea judging commenced on February the 2nd.

Although conditions of soil and climate vary greatly from place to place, there is a need for conserved fodder on every farm and as improvement of pastures proceeds and more stock are carried, greater reserves are necessary to provide for lean periods.

Primarily, the conservation of fodder is an insurance against lack of rainfall and therefore, generally speaking, the requirements in various districts should be correlated with the reliability, incidence, and the amount of the rainfall or irrigation, but in addition, the class of stock carried is a modifying factor.

In the Yea district, fat lamb raising and dairying are the main agricultural pursuits. There are excellent flats along the Goulburn and Yea rivers capable of carrying first class mixed pastures. The rising country responds well to superphosphate and grows subterranean clover to perfection.

In a good season there is an abundance of spring growth and ample material is available for conservation, but the past year was only fair. The season broke early with heavy rain in January, and in April and May, when ordinarily conditions are very suitable, for rapid growth, rainfall was scanty When good rains did come, growth was limited by cold conditions and the spring flush was relatively poor, because rainfall was below normal.

Having due regard to the seasonal conditions and to the shortage of labour, one cannot be too critical of the fact that all competitors had conserved well below the requirements as set out in the judging schedule. In a district such as Yea, where rainfall is usually reliable and little hand feeding of sheep is necessary it would seem that a reserve of approximately 3 cwt. of fodder per mature sheep is hardly necessary, and it was apparent that those competitors who were mainly interested in sheep could not compete very well with those who were engaged in dairying.

With one exception, the conserved fodder at all places was in the form of hay. Although silage is credited with having special virtues for feeding stock, particularly milking cows during January and February, in the North-east where conditions are usually quite favourable for hay making one could not recommend the reservation of all of the surplus as silage. It would seem, however, that some silage should be made on every farm with the idea of spreading out the period of harvesting and so relieving the congestion at harvest time and providing fodder resistant to fire.

Points for suitability of fodder were mainly based on whether the material was dry or succulent or whether the material was of a protein-rich nature or not. In general, animals suffer most from a shortage of protein during the summer and of course green and succulent food is most relished at this time of the year, while during the winter period there is a greater need for bulky foods rich in carbohydrate. Oaten hay is quite good for feeding to milking cows during the winter, while good meadow or lucerne hay is very suitable for providing extra protein during the dry period.

Several crops of maize and millet were seen on the river flats throughout the district, but generally appeared to be a little backward. This probably was a reflection of dry conditions earlier in the season.

Of the dry fodder submitted, the oaten hay generally was of good quality, being fine in the straw and well-headed. In practically every case it was slightly discoloured as a result of rain in November, but this did not appreciably detract from its fodder value.

Various types and kinds of stacks were inspected and some competitors lost points for stack building. Most of the stacks were built on a wooden floor and a number were protected by covers made from old manure bags. At Mr. Guymer's place, the covers had been treated with tar to preserve them, which is important now that bags are becoming scarce. All the hay sheds seen during the judging were good, and the one on Mrs. Allcock's property deserves special mention. Several chaff sheds were inspected and at one place where the floor had been made of concrete it was drawing the moisture and making the chaff musty. Probably the easiest way to correct this trouble is to treat the floor with tar or bitumen emulsion.

A well-built hayshed on Mrs. W. Allcock's property. Guttering and downpipes ensure that no damage to fodder can result from run-off from roof.

the latter being the easier to handle as it can be applied cold, with a wet broom.

Although oaten hay or chaff is an asset on any farm, except where it is needed for special purposes such as feeding to working horses, it is generally more economical to build up reserves of good meadow hay. One must be careful, however, to note that it is good meadow hay that is required, not dried grass stalks, for there is a great difference in the fodder value of various kinds of meadow hay.

First stage in pasture improvement on river-flat land at Yea. Rough pasture ploughed and sown with maize.

The production of good meadow hay depends on having good pastures so that pasture improvement should be the basis of fodder conservation. Broadly speaking, one values meadow hay on its clover content, and on this basis the produce submitted by the Yea competitors was of fair to good quality. There was, however, a most obvious difference in the kinds of grasses mixed in with the clover at various places, and this was responsible perhaps for the greater part of the discussions that took place during the inspection.

Most farmers in the district are aware that it is desirable for some grass to be associated with the clover to give balance to the diet, and while the flats can carry excellent perennial rye grass on all but the areas subject to heavy flooding, this grass does not appear voluntarily on the lighter hill country, and barley grass and spear grasses are prominent in the improved pastures.

Some of the more progressive men in the district have attempted to introduce perennial rye grass on the slopes and rises, but with indifferent results, as it does not persist for long and on the drier banks actually depresses the growth of the subterranean clover.

It would seem that Wimmera rye grass would be the appropriate grass to grow with the subterranean clover, as it mixes well with it, and having approximately the same growth period as the clover, would fit in well with the climatic conditions. A sowing of 2 lb. per acre with the last oat crop or 4 lb. per acre, drilled in on an old subterranean clover paddock after the clover has germinated would be a satisfactory method of establishing this grass. Being annual in character, re-seeding is necessary each year, and grazing should be regulated to allow this to take place in November. An occasional harrowing in the autumn is usually necessary to rejuvenate the stand when it becomes thin, but re-sowing should not be necessary once it becomes well established.

It should be borne in mind that the sowing of grass should not precede the establishment of clover as the grass depends on the nitrogen reserves built up by clover. Without these its growth is poor and disappointing. At one place perennial rye grass had been sown on a flat without clover and although it had taken very well, there was a strong re-growth of silver tussock and it is expected that the pasture will not be very satisfying to stock until clover is introduced into the sward. Owing to the persistent nature of the perennial rye grass this may take a number of years, with a consequent loss of grazing in the meantime.

Pasture improvement of tussock land on the Yea flats could be carried out by plowing in the spring, using maize as a clearing crop and sowing down the following year with a mixture of 4 lb. of perennial rye and 3 lb. of "mid-season" subterranean clover. Generally, conditions are not moist enough for white clover, but in the depressions strawberry clover grows well and is worth encouraging. *Phalaris tuberosa* is more suitable than perennial rye for the lower places where barley grass often predominates, and it grows well with strawberry clover. Seed of "Phalaris," however, is

Maize and pumpkins growing on the Goulburn river flats at Molesworth.

expensive and as it does not always establish easily, perhaps the best procedure for small areas is to grow some plants of "Phalaris" in the garden and dig in parts of the plants with the shovel when the ground is soft in the early spring. Once established it thickens up.

Strong stands of lucerne are grown in the Yea district, both on the flats and the rising country, and the value of this perennial legume is generally recognized. The main essential when choosing a site for lucerne is to select a well-drained bank, as it is very sensitive to "wet feet." Lucerne is not easy to establish and there are numerous traps for the unwary. On the flats a September seeding is generally preferable and 6 to 8 lb. of seed is the rate of sowing recommended. For the rising country, early autumn sowing on clean fallowed land is probably the best, although an August seeding can be quite satisfactory if spring rains are normal. Late autumn sowing, or sowing on a hastily prepared seed-bed should be avoided.

In the Yea district, lucerne stands are usually cut about November and then grazed until the autumn unless late rains stimulate a heavy growth suitable for mowing. In making the first cut in the spring it is desirable to cut as early as possible to catch the annual grass before it seeds and becomes fibrous.

The winner of the competition, Mr. Gilbert Brown of Molesworth is a newcomer to the district and judging by the fine trophy possessed by Mr. Brown, junior, for practical agriculture it would seem that prize-winning runs in the family. Mr. Brown's stacks of oaten and meadow hay were nicely built and the essence of neatness, while on the flats there was a vigorous crop of maize well forward and almost ready for feeding to the cows. The meadow hay entered by this competitor was well-cured, of a good colour, and rich in clover, but lost points because it contained too much wallaby grass.

At this farm a programme of pasture improvement is being carried out and on those parts of the flats which at present are carrying rushes and tussock grass the first step is to grow maize or pumpkins, and as time permits, the land is sown down to a mixed pasture of perennial rye grass and subterranean clover. Mr. Brown intends to try out *Phalaris tuberosa* in the wetter parts of the river flats and had several bags of "Phalaris" hay curing in the barn for the purpose of obtaining seed for experimentation.

Home-made rack for feeding hay to sheep and cattle.

[Continued on page 129.

Wartime Vegetable Growing at Home

By Officers of the Horticultural Division

THE following brief article is issued as a general guide to the many people who desire to grow vegetables in the home garden because of the prevailing shortage of supplies.

The best vegetables to grow at home are probably carrots, parsnips, and red beet (root crops), lettuce, silver beet, and spinach (leaf crops), peas and beans (legumes), and early white onions.

Layout of Garden.

Choose a site which is not shaded, particularly in winter, and is sheltered from hot north winds. Make the rows of plants run north and south if possible, but not up and down hill. Beds 4-5 feet wide are convenient to handle. In heavy soils, build the beds up 6 inches above the paths. The edges may be kept neat with boards, or with narrow strips of perennial plants such as herbs.

Soil Preparation.

Deep working of the soil is advisable. Trench the beds to 18 inches or to the sub-soil, whichever is the shallower. Avoid bringing sub-soil to the surface. Bury vegetable waste deeply, for mixing with the top-soil at the next trenching.

Do not use a plot for the same type of crop twice in succession, and spell each plot for at least a fortnight between crops, leaving the soil roughly dug over. Break the surface down finely just before planting.

Once a year, preferably in autumn, the freshly-dug bed should be limed at the rate of about half a pound of agricultural lime per square yard. Finely-sieved ashes from the burning of garden prunings or wood fires also may be used; but other ash or unsieved ashes should not be thrown on the vegetable garden.

Manuring before Planting.

Use animal or fowl manure if obtainable. It will pay you and help the country, because artificial fertilizers are scarce. Do not use these manures fresh on any crop—let them rot in a heap for three or four weeks, or work them into the soil three or four weeks before planting, except that a root crop should not be planted within three months of applying such

manures. Up to 4 inches of animal manure or 2 inches of fowl manure spread over the soil and worked in is good.

Animal manures should meet all requirements, but if sufficient of these are not available work as much plant waste as possible into the soil and apply artificial fertilizers. If relying on artificial fertilizers, it is well to remember that all vegetable crops require superphosphate—1 oz. to the square yard worked in before planting. (A match box well filled holds an ounce of fertilizer.) Root crops and onions require, in addition, half an ounce of sulphate of ammonia or 1 oz. of blood manure per square yard, and leaf crops double these quantities. Peas and beans require mainly superphosphate. Market garden manure is a popular general-purpose mixed fertilizer.

Sandy soils would benefit from half as much fertilizer again as the above quantities.

Planting.

In the national interest, vegetable seeds should be used as economically as possible. Planting details are given in the accompanying table. Seed rows are best covered with fine soil, or a mulch of fine stable manure or chaff, to prevent caking of the surface. A strip of hessian or bagging laid along the rows is also effective.

Watering.

Water well before preparing the surface finally for sowing. Lightly water after sowing, and in hot weather water lightly once or more each day until the seedlings are 1 inch high. In cool weather keep the surface moist with less frequent waterings. When plants are firmly established, water deeply once or twice a week. Lettuce are best watered by a furrow rather than a sprinkler, especially in the cool months. The vegetable garden needs more water than the flower garden to keep it in vigorous growth.

French Beans.

Cultivation.

Keep weeds down and the soil surface loose by light cultivation when necessary. A surface-mulch of stable manure or lawn clippings will assist. Do not use a cultivating implement within an inch or two of the vegetables or they may wilt, due to the surface roots being damaged.

Manuring During Growth.

If the growth of leaf crops slackens before maturity, work in an ounce per square yard of sulphate of ammonia or blood manure. Silver beet will require half an ounce of market garden manure per plant every three months. Do not work in manure within 6 inches of the stems of the plants.

Rotation.

The ideal sequence of crops on a plot is:—

1. Leaf crop—using stable manure, if available.
2. Root crop or onions—avoid using stable manure, use superphosphate and sulphate of ammonia.
3. Legume—use superphosphate only, dig in plants after picking pods.

Then start again at the leaf crop.

If tomatoes are grown, they follow a legume best, and should be followed by a leaf crop.

Pest Control.

Aphis may attack carrots and parsnips, particularly while the plants are small, and cause stunting of the leaves and death of the plants. They can be controlled by spraying with nicotine sulphate, half a teaspoonful to a gallon of water, or dusting with derris or nicodust.

NOTE.—It is proposed to issue shortly comments on the growing of other vegetable crops which require greater areas and more attention for successful production. Cabbages, cauliflowers, turnips, celery, pumpkins, marrows, and rhubarb will be included.

The time taken to reach maturity, the period over which the crop may be used, and the approximate length of row required at each planting to supply a family of five are shown in the following table:—

Crop.	Time of Maturity.	Period of Usage.	Storage.	Length of Row per Planting for Family of five.
	Months.		*In the ground*	Feet.
Carrot	3–4	8th–17th week	2 months	50
Parsnip	5–6	18th–30th „	2 „	50
Red Beet	2½–3	10th–17th „	1 month	30
			Strung up	
Early White Onion	7–8	24th–36th „	6–8 weeks	50
Silver Beet	2–3	Continues to crop for period up to 24 months with main crop in winter and spring	..	6
Spinach	2–2½	6th–12th week	..	20
Lettuce	2–3	6th 12th „	..	25
French Beans	2½–3	10th–14th „	*In bottles*	30
Climbing Beans	2½–3	10th–26th „	*In bottles*	6
Broad Beans	4½–5	18th–26th „	*In bottles*	20
Peas	3–4	12th–16th „	..	30

PLANTING TABLE.

Crop.	Best time to Sow.	Method of Sowing.	Depth of Sowing.	Distance between Seeds.	Distance between Rows.	Time to thin or Transplant.	Distance between Plants.
			Inches.	Inches.	Inches.		Inches.
Carrot	Dec.–Jan. and Aug.–Sept.	Shallow drill	½–¾	½	10–12	2″ high	2–3
Parsnip	Dec.–Jan. and Aug.–Sept.	Shallow drill	½–¾	½	12–15	2″ „	3–4
Red Beet	Feb.–Mar. and Sept.–Oct.	„ „	¾–1	1	12–15	2″ „	4
Early White Onion (Silverskin)	Feb.–Mar.	Shallow drill or seed bed.	½–¾	½	10	4″–6″ high	3–4
Silver Beet	Jan.–Sept.	Shallow drill	¾–1	1	18	3″ high	9
Spinach—							
Prickly Seeded	Feb.–Mar.	„ „	½–¾	1	12–15	2″ „	4
Round Seeded	Aug.–Sept.	„ „	½–¾	1	12–15	2″ „	4
Lettuce—							
Imperial 847 and 850	Jan.–Feb.	Shallow drill or seed bed	½–¾	½	12	2″ „	10
Imperial D	Apr.–May	„ „ „	½–¾	½	12	2″ „	10
New York and Imperial 615	Aug.–Sept.	„ „ „	½–¾	½	12	2″ „	10
Iceberg and Imperial F.	Nov.	„ „ „	½–¾	½	12	2″ „	10
French Beans—							
Brown Beauty	Oct.–Nov.	Drill or dibble	1–2	5	15–18	..	5
Butter Beans	Oct.–Feb.						
Other Varieties	Oct.–Jan.						
					Feet.		
Climbing Beans	Oct.–Nov.	„ „ „	1–2	9	2–3	..	9
Broad Beans	Mar.–May	„ „ „	2–2½	9	2	..	9
					Inches.		
Pea—							
Melbourne Market	July-Oct.	.. .. ..	1½–2	2–3	12–15	..	2–3
Greenfeast	July-Dec.	„ „ „	1½–2	2–3	12–15	..	2–3
Yorkshire Hero	Nov.–Feb.	„ „ „	1½–2	2–3	12–15	..	2–3

Note.—Planting times may be extended a month earlier and later with less chance of success.

Live Stock Notes

Compiled by A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer.

MANY stock owners regarded the restrictions imposed on the railing of fodder at the beginning of February as disastrous. However, the announcement that the restrictions would be lifted at the end of the first week relieved their anxiety, especially of those engaged in dairy, pig, and poultry farming.

The restrictions showed how dependent farmers have allowed themselves to become on fodders imported from other districts, in spite of the continual urge to grow and conserve more fodders on the farm. In Gippsland, farmers could grow more green fodder crops and conserve more hay for their cows, and grow more maize, peas, potatoes, turnips, &c., for their pigs. More oats, barley, and wheat also could be grown for grain in certain areas of Gippsland for local use. The same applies to dairy farmers and pig raisers in the Western District, the North-East, the irrigation areas, and other parts of the State. However, these farmers have an advantage over the Gippslanders in that they are nearer to hay and grain-growing areas.

Dairy Cows.

Dairy farmers can well afford to keep an eye on the beef market. Dairy herds are more closely and profitably culled when beef is high. But is it advisable to cull the dairy herds so heavily that it is necessary to buy sheep to keep the farm adequately stocked? Certainly, culled cows are selling well and old ewes are cheap, but as a special war-time emergency measure why not buy an Aberdeen Angus, Hereford, or Shorthorn bull and produce vealers from the dairy cows that cannot be milked on account of the labour shortage? There is an over-production of lamb and mutton while beef is scarce and payable prices for beef have been offering for several years now. By keeping the better-breeding cows for vealer production during the present unsettled period farmers would have a nucleus from which to build a good dairy herd when conditions again became favourable for increasing butter production.

Dairy farmers who are able to supply whole milk for drying, condensing, or cheese, should not consider reducing their herds, but should make every effort to maintain production.

The Pig Market.

During 1941 there was a marked reduction in the number of breeding sows kept in Victoria. Some indication of this is given by an examination of the numbers of backfatter sows

and pigs of all other classes sold at the Melbourne Pig Market. During the last half of 1941 the proportion of backfatter sows to all other pigs sold was 1 to 9, while the average for the previous five years was 1 backfatter to 18 other pigs.

Reasons for the decrease in pig breeding include:—

1. The unfavourable ratio of grain prices to pig prices during 1940 and 1941 for those pig raisers who purchased grain;
2. The disorganization of the export market early in 1941 which, although only for a period of about three months, caused producers to lose confidence;
3. The change from butterfat to whole-milk production on some farms; and
4. A shortage of farm labour.

The reason why the falling off in the numbers of porkers and baconers marketed did not follow so closely on the slaughter of brood sows was probably due to the holding of a large portion of the pigs born in the autumn of 1941 in store condition through the winter to fatten on the spring milk supply rather than feed them grain at its relatively high price. That crop of pigs has now been marketed, and a sharper fall in porker and baconer supplies is expected in the immediate future.

The number of useful breeding sows being marketed for slaughter is still proportionately high, and there are indications that many culled sows are not being replaced on farms.

The future of the export trade in pig meats may be uncertain, but in view of the increase in the canning of cured bacon rashers and other forms of pig meats for export, and an increase in the local consumption of pig meats, a shortage of pigs is a real possibility.

Last season's barley crop was heavy and, where transport is available, barley can be purchased at a favourable price to pig raisers, but the labour shortage on farms has become so acute that farmers who reduce their pig herds last year are unlikely to restore them under present conditions. Even barley growers may be unable to re-enter the pig industry for the same reason.

So far as can be anticipated under the present circumstances, those farmers who continue to breed pigs appear to have good prospects for the immediate future. If they should be called upon to produce a great quantity of pigs' meats, they could best do so by carrying their pigs to heavier weights than usual before marketing them. To do this and yet produce pigs which are not excessively fat it would be necessary to feed limited rations to pigs during the last month of the feeding period, thus allowing the pigs to fatten more slowly and increase in length rather than in thickness. Of course, the use of large-type breeding stock helps in this direction, but the restricted diet also helps solve the problem with pigs which tend to fatten at light weights.

[L. A. Downey, H.D.A., Pig Expert.]

Sheep.

All rising one-year-old stud sheep should be checked over and tentatively classed for stud, show, and sale purposes. More attention should be given to the young rams, and promising individuals should be selected for special treatment and further observations. This preliminary classing is more important with the British breeds and Corriedales than with Merinos and Polwarths.

Ewes of the British breeds should now take the rams and, to ensure a good crop of lambs, the rams should be in good active condition and not excessively fat.

Foot-rot has been noticed in a number of flock sheep inspected during the past few weeks, although with the dry weather that was experienced flock owners have had ideal conditions for controlling it. Control in these early stages is more satisfactory and requires much less labour than if the disease is allowed to spread and has to be combated when the weather is colder and wetter.

Annual Sheep Show Abandoned.

At a special committee meeting of the Australian Sheep Breeders' Association it was decided to abandon, this year, the annual sheep show usually held in Melbourne towards the beginning of August, but, if possible, stud sheep fairs will be held at various country centres during the year. The following motion was agreed to:—"That after the most careful consideration regarding the use of transport, &c., and the unanimous decision of the Committee to stand solidly behind the Government's total war effort, it be resolved to abandon the sheep show this year."

[N. A. Bowman, Sheep and Wool Expert.]

Poultry.

Selection of Breeding Stock for Egg Production.

At this time of year it is usual to cull flocks when selections can be made for breeding stock, layers, and culls.

The selection of breeding stock is most important, for success depends upon the judgment displayed in placing the right birds together. This can be carried out only by those with the necessary experience.

It is not possible to estimate the number of eggs a bird of normal appearance has laid or will lay without keeping an individual record of its performance, nor is it possible by handling to determine what desirable qualities a bird of either sex will transmit to its progeny. Egg-production records and progeny tests, therefore, assist in the selection of breeders.

It is not always possible for farmers, especially those in a large way, to single-test or trap-nest sufficient birds from which to select breeders, and unfortunately, therefore, many birds must be selected by appearance and handling. Only the best are suitable for breeding.

The following hints will serve as a guide in the selection of the best stock:—

A bird (male or female) should appear bright, active, and healthy. It should be mature, well-developed, of normal size, and vigorous in constitution. The eye should be full, prominent, and bright. The bird should have a good depth of body, with a long broad back and a straight breastbone. It should be tight in feather and free from weaknesses, deformities, or visible external faults. The females should show evidence of ability to lay a large number of eggs of the required size, shape, and shell texture. All this, however, means very little unless both sexes are bred from families of high egg-producers and other good qualities.

[H. F. Clinton, Poultry Expert.]

Bees.

In preparation for moving their bees to localities showing promise of a good autumn flow of honey, where grey box, red ironbark, and stringy bark are the principle eucalypts in bloom, many beekeepers have been busy extracting the last of the red gum and yellow box honey.

In some cases an acute pollen shortage has been responsible for a rapid decline in the strength of individual colonies. Where this decline has been general throughout the apiary, a good pollen supply should be the first consideration when deciding to move to a new location.

The advantages of strong colonies for a short flow have been fully emphasized by the returns of one Western District beekeeper who reported a yield of 600 tins, each 60 lb., of honey from 250 colonies. Red gum was the source of supply and the flow lasted for about six weeks. From inquiries made, it would appear that the average for this district would be about 80 to 100 lb. per colony.

Bees use a considerable amount of water, and, where possible, the apiary should be located near a stream or dam, otherwise provision should be made for supplying the necessary water in a container with a float of buoyant, porous material, thus enabling the bees to secure water without drowning.

Colonies which have been below average strength should be re-queened without delay so that the young queen can face the winter with a reasonably strong force of young workers.

Satisfactory prices (6d. to 7d. per lb.) are being quoted for new season's honey.

[J. W. Thomlinson, Apiary Inspector.]

VETERINARY NOTES.

Round Worms in Poultry.

The treatment recommended for the elmination of round worms in poultry is to add 2 ccs. (or 31 minims) of nicotine sulphate to 1 pint of water. Mix thoroughly with 4 lb. of dry mash. This would be a daily ration for 25 pullets about four months' old. The treated mash is left in front of the birds all day, and any unconsumed mash should be discarded at night. The feeding of grain at night should be discontinued during treatment. Green food should be given at midday, and droppings should be collected and burnt daily. Treatment should be continued for seven days, and repeated a month later if necessary.

The nicotine sulphate, which is usually obtainable from any chemist, must be carefully measured and well mixed, as it is poisonous if an overdose is given. The hands should be well washed after mixing the drug.

Points to remember during treatment are:—

Give careful attention to cleanliness.

Regularly remove droppings from pens and destroy by burning.

Phenothiazine for Sheep.

Dose Rate.

From Information Circular No. 7, published recently by the Council for Scientific and Industrial Research on the use of the phenothiazine drug, it appears that 20 grammes is sufficient for treatment against nodule worm in adult sheep. It is suggested that this be the recommended dose instead of 25 grammes as previously recommended. The reduction of 5 grammes means a saving of 500 grammes on each 100 sheep dosed, or sufficient to dose a further 25 sheep. In terms of cost this represents a saving of 7s. 2d. per 100 sheep when phenothiazine is sold at 6s. 10d. per lb.

It is suggested that firms now marketing phenothiazine should make the necessary alterations in dose rates.

When the phenothiazine powders now on the market are mixed with water at the rate of 1 lb. of powder to 16 fl. oz. of water, the dose for an adult sheep (20 grammes) is contained in 30 c.c. (1 fl. oz. approx.) of the resulting suspension. Suspensions made with these proportions are suitable for use with drenching syringes, but may be too thick for use with drenching funnels. If funnels are to be used, the suspension can be thinned with some water and the dose rate increased accordingly.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

FODDER CONSERVATION COMPETITION, YEA—*continued from page 122.*

Second place is shared by Mrs. W. Allcock and Mr. H. R. Jackson, of Yea, each with 91 points. The last-named competitor had more fodder per stock unit, but lost points through not having any protein-rich fodder for his cows. It appeared from the abundance of dry grass and the fact that there was a large carry over of fodder from previous years on Mrs. Allcock's farm that it was understocked and in accordance with the schedule of judging, an adjustment had to be made in allocating the points to this competitor. The best lucerne seen in the district was on Mrs. Allcock's flats.

Mr. Carey, of Yea, who gained third place also was considered to be understocked. This competitor had a nice 10-acre paddock of lucerne, growing well on rising land, indicating the possibilities of growing this valuable legume on the slopes of the Yea district. A point of special interest on this farm was the home-made hay rack which consisted of a 3 in. x 1½ in. hardwood framework caged in with ringlock wire. This was considered to be a very useful addition to the farm equipment and worth inspection by others in the district.

Points allotted to the various competitors are shown in the following table:—

Fodder Conservation Competition at Yea.

Name.	Quantity and Quality. (80)	Green Crops. (10)	Quantity in Excess. (60)	Suitability. (15)	Condition of Stock. (10)	Location. (10)	Protection. (15)	Total. (200)
1. Gilbert Brown, Molesworth	44	10	..	15	10	10	15	104
2. Mrs. W. Allock, Yea ..	31	10	..	15	10	10	15	91
H. R. Jackson, Yea ..	43	5	..	11	8	10	14	91
3. Thos. Carey, Yea ..	20	5	..	15	10	10	15	75
4. T. R. Guymer, Homewood	33	..	..	8	9	10	14	74
5. Wm. Drysdale, Homewood	18	2	..	15	9	10	14	68
6. Geo. Drysdale, Homewood	16	..	..	15	10	10	15	66

Shortage of Materials for Worm Drenches

SUGGESTIONS FOR CONSERVATION OF SUPPLIES

The following article is supplied by the Division of Animal Health and Nutrition of the Council for Scientific and Industrial Research.

SUPPLIES of many drugs used in worm drenches come from Europe and America. Supplies were short and prices rising before Japan entered the war, and difficulties since then have increased enormously.

Bluestone and arsenic are still available. Nicotine sulphate is in short supply since only a proportion of requirements is made in Australia. Carbon tetrachloride and tetrachlorethylene are very short; neither of these drugs is made in Australia, importation is difficult, and they are needed for other essential purposes. Phenothiazine is not yet made in Australia, and overseas supplies are very restricted and expensive.

The following recommendations are issued so that sheep owners and manufacturers of drenches may conserve existing supplies and eke them out as far as possible:—

Liver Fluke.—Carbontetrachloride is essential. Use single strength mixtures, i.e., a 1 cc. dose of the drug. Even on very "fluky" country use at most three times during the year, at the end of April, middle of June, and end of July.

Large Stomach Worm or Barber's Pole Worm (*Haemonchus*).—Use bluestone or bluestone-arsenic mixture for young sheep. Use bluestone-arsenic mixture for grown sheep. Do not use carbontetrachloride or bluestone-nicotine mixture; there is not enough to spare and they are not essential for this particular purpose.

Where there are some sheep which fail to respond to repeated treatments with bluestone or bluestone-arsenic mixture, remove them from the general flock, place them in hospital paddocks, and feed well, besides repeating treatments.

Small Intestinal Worm or Black Scour Worm (*Trichostrongylus*).—Use bluestone-nicotine mixture. For the "tail" of weaner flocks which has not responded to this treatment use tetrachlorethylene (if obtainable) following a dose of bluestone, or where possible use phenothiazine. Provide adequate feed.

Nodule Worm (*Oesophagostomum columbianum*).—Use the enema treatment. This is very effective but must be used skilfully. Get particulars from the local Veterinary Officer and follow instructions carefully. Conserve phenothiazine for use in outbreaks.

Bluestone-arsenic Mixture.—It has been found that the spirits of salts (hydrochloric or muriatic acid) formerly recommended for use in this mixture can be replaced by sodium bisulphate ($NaHSO_4$), commercially known as "salt cake". It is a white, crystalline solid which readily dissolves in water. The mixture can be made as follows:—

Dissolve ½ lb. bluestone (copper sulphate) in 1 gallon of water. Dissolve 2 oz. arsenite of soda (containing 60–65 per cent. of arsenic as AS_2O_3) in 1 gallon of water. Dissolve 4 oz. sodium bisulphate in 1 gallon of water. Mix the bluestone and arsenite of soda solutions. A greenish sediment will form and this is dissolved by adding the sodium bisulphate solution.

The dose rates for this mixture are the same as those used for the originally recommended mixture containing spirits of salts, viz.:—

Grown sheep ..	1 fl. oz. (30 cc.).
Sheep 12–18 months	¾ fl. oz. (25 cc.).
Sheep 8–12 months ..	½ fl. oz. (15 cc.).
Sheep 4–8 months ..	⅜ fl. oz. (10 cc.).
Lambs under 4 months	¼ fl. oz. (8 cc.).

Some graziers prefer to give bulkier doses (2 fluid ounces for grown sheep down to ½ fl. oz. for lambs). If this is desired, use the same quantities of arsenite of soda and sodium bisulphate, but increase the bluestone by ½ lb. and add another 3 gallons of water. The dose rates for sheep of different ages are then twice those given in the above table. The addition of ½ lb. of bluestone is needed to maintain the concentration of this drug in spite of the additional water. Otherwise the strength of bluestone in the mixture may be too low to carry the dose into the fourth stomach.

In any outbreak of infection with large stomach worm or black scour worm move the sheep if you possibly can, at intervals of not more than three weeks, and put them in paddocks which have been spelled or which have had healthy adult sheep in them and are carrying the best feed.

Rutherglen Crop Competition

Report of the Judge—J. A. MORROW, B.Agr.Sc., Manager Experiment Farm, Rutherglen

THE Rutherglen district experienced difficult conditions for the preparation of fallow for the 1941 crops. Dry conditions prevented early fallowing, and a large proportion of the land was not ploughed until September and October. These conditions continued until the New Year when a succession of good rains was received. Farmers soon had the soil in good order and many had commenced sowing before the end of April. This normally would involve a risk of subsequent weed growth, but dry conditions again set in and very few weeds became sufficiently well established to compete with the wheat crops. The crops sown early received a very marked initial advantage which was maintained throughout the season, and despite the exceptionally dry conditions the yields in every case must be regarded as very satisfactory. Wheat sown later was forced to struggle throughout the season, and yields were considerably lower. It was estimated that the average yield of all crops in the competition would be in the neighbourhood of twelve bags, the winning crop yielding better than fourteen bags per acre.

Harvesting in the North-East.

Tests at the Rutherglen Experiment Farm have shown that crops sown on land fallowed in July will outyield crops on October fallow by about 5 bushels per acre, provided that weeds are checked on the fallow by grazing and efficient cultivation. On the other hand if the fallows are neglected, much of the benefit from early fallowing is lost and differences in yield will be smaller and more irregular.

The benefits of early fallowing are well known throughout the district, but conditions frequently occur, especially with some types of soil, which prevent a rigid adherence to principles known to be most suitable when taken over a period of years. Such conditions prevailed in 1940, when ploughing proved impracticable until relatively late in the season. The dry conditions did not favour weed growth and it was possible in most cases to keep the weeds suppressed by grazing with sheep, rather than by cultivation, and little work was done on the fallows until the New Year.

The practice of keeping weeds in check by sheep and limiting cultivation is quite a sound practice, particularly where the soil is likely to set, provided the grazing is efficiently carried out and the ground is in reasonably good condition. Besides taking up time which often could be utilized more profitably, excessive cultivation has a tendency to reduce soil fertility by breaking down the soil structure.

Repercussions from the war are affecting our agriculture, and from the fluctuating conditions there have emerged a few definite indications of the manner in which our practices must be modified to maintain the greatest efficiency. A new balance is required to adapt production to meet problems of labour, markets and war needs. These have imposed restriction of output of some crops, and have called for alterations in land utilization, hitherto not seriously considered.

The stabilization of our war economy has involved some apparent sacrifice by individual farmers. Where such sacrifice occurs it is regarded by most farmers as part of their contribution to their war effort, but if full advantage is taken of the position it may well

happen that what appears to be a loss at present, may mean a decided advantage when the time comes for the resumption of normal peace-time production.

The agricultural community has for long been faced with problems of marketing its produce at prices sufficiently high to cover the cost of production. The establishment of facilities of treating, and disposal, of alternate crops has opened up new prospects in many districts. Unfortunately, the extent to which alternative crops such as flax can be grown is limited by soil and climatic conditions.

In other districts restriction of production of certain crops may give the farmer an opportunity of making restitution for the long years of exploitation to which he has subjected the soil.

Over a large area of Australia, soil fertility is declining owing to the effects of exhausting crop rotations, faulty cultivation, and in the case of pasture lands, to the failure to make good, losses due to grazing.

If the reaction to reduced cropping area whether imposed by regulations, market, or labour conditions, were an attempt to remedy the damage done to our soils in the exploitation period, farmers generally would reap an ultimate benefit from the present restrictions.

In most areas rehabilitation of the soils does not appear to be an immediate necessity, but in others the effects of over cultivation are already apparent. In all cases, the time is opportune to introduce methods of farm management which will enable production to be maintained at the required level, with a minimum of labour and other costs. In some districts this will present difficulties due to size of holding, nature of the soil, and limited facilities for mixed farming operations, but in the area surrounding Rutherglen the introduction of suitable cropping systems is a relatively simple matter. The value of subterranean clover in the regeneration of soil fertility has been demonstrated at the Rutherglen Experiment Farm, and progressive farmers are now adopting clover rotations as an integral part of their cereal production. The general adoption of this system will result in an all round increase of soil fertility, and at the same time reduce the labour requirements for the working of the farm. Farmers who are running their farms on these lines are satisfied that the extra wool and lambs they can produce will be ample compensation for the restriction of cereal production, and that the higher yields of wheat obtained will result in a marked lowering in the cost of production.

For subterranean clover to give satisfactory results either in a pasture or for soil regeneration, adequate top-dressing is necessary.

As supplies of superphosphate are now limited and the position is not likely to improve for some time, it is necessary to use to greatest advantage such quantities as are available. This is difficult to decide, particularly in mixed farming where consideration must be given to several types of production, effect on fertility, and the need for immediate returns. The possibility of deterioration of pastures, and many other factors, also must be considered.

In cases of doubt the ration should be so used that future production will be impaired as little as possible. It may be necessary to draw to a certain extent on the reserve of soil fertility, but if this is done rationally no permanent harm will result.

At Rutherglen, in carefully designed tests separated only by a fence, the yield of wheat on clover lay land without manure has been greater than that on ordinary fallow with ½ cwt. of superphosphate, and only slightly less than where 1 cwt. per acre was used. Half hundredweight of superphosphate per acre on clover lay land has given higher results than 1½ cwt. on fallow. The actual yields obtained were—

—	No Manure.	Super. ½ cwt.	Super. 1 cwt.	Super. 1½ cwt.
	bus.	bus.	bus.	bus.
Wheat after clover	26·2	34·5	37·0	37·4
Wheat on fallow .	14·0	26·1	29·4	30·3

These figures suggest a possible method of maintaining production without interfering to any great extent with farm activities, and at the same time to lay the foundations of a sound rotation system for the future.

Where clover paddocks are available these could be sown to wheat with a greatly reduced dressing of superphosphate—say, ½ cwt. per acre, or even less. The superphosphate saved could be used for pasture development and so build up fertility for subsequent cereal crops without reduction in carrying capacity, or deterioration of the pastures.

Where the principles of clover lay farming are applicable it is desirable to give the pastures preference in the application of superphosphate. This will result in little or no

reduction in yield of wheat compared with heavily manured ordinary fallow, and will ensure that the clover pastures are maintained at a sufficiently high level of production to raise the fertility for subsequent cereal crops.

Where clover pastures are kept in good order by adequate dressings of superphosphate and rational grazing, there is little opportunity for the spread of undesirable weeds. If neglected, the efforts for many years in the control of saffron thistle and other weeds are likely to be lost, and a deterioration in the carrying capacity is certain to occur.

Competition Results.

First prize in the competition was shared by Mr. F. Jenvey and Mr. G. R. Pearce, both of Springhurst.

Mr. Jenvey's crop of Baldmin was grown on Mr. W. Baker's paddock at Springhurst. The paddock had been rather leniently treated as far as cropping was concerned, the farm being worked on lines similar to those recommended by officers of the Experiment Farm. The paddock was last cropped in 1937 and 1938 after having been under pasture during the preceding eight years. It was left as lay in 1939 and fallowed during 1940 for the crop shown in the competition. The paddock was ploughed early in October and then harrowed. It was cultivated before harvest and again in January. Two further cultivations were given before sowing in May with 70 lb. of Baldmin seed and 1 cwt. of superphosphate.

The resulting crop would yield about fourteen bags per acre and was notable for the absence of weeds or "strangers." No disease was present, but a small amount of lodging had taken place during a storm a few days before judging.

Mr. Pearce's crop of Baldmin was estimated to yield a little more than fourteen bags per acre. The crop was taller and denser than Mr. Jenvey's but included a few weeds, and some gaps where sufficient over-lap had not been taken with the drill. The land was ploughed in August and harrowed after the plough. No further cultivation was given until January, when it was scarified.

The paddock received two more cultivations before sowing with a drill on April 20th. 68 lb. of seed and 100 lb. of superphosphate were used. The ground was harrowed after the drill.

Messrs. D. J. and J. T. Dunne, who gained third place, had a good even crop of Baldmin, free from weeds and "strangers." It was estimated to yield about thirteen bags per acre. In each of the above crops the grain was well filled and showed no effects from the dry winter and spring conditions.

Details of the points allotted are as follow:—

Rutherglen Crop Competition.

Name.	Locality.	Variety.	Yield.	Purity and Types.	Evenness.	Freedom from—		Total.	Place.
						Weeds.	Disease.		
Maximum Points ..	.. .. ..	.. ..	35	20	15	15	15	100	
F. Jenvey	"Baker's" Springhurst	Baldmin ..	34	19	14	15	15	97	1st equal
G. R. Pearce	Springhurst ..	Baldmin ..	35	19	14	14	15	97	
D. J. and J. T. Dunne ..	Springhurst ..	Baldmin ..	31	19	14	15	15	94	3rd
F. Jenvey	"Webb's," Springhurst	Baldmin ..	30	19	14	15	15	93	
D. J. and J. T. Dunne ..	Springhurst ..	Dundee ..	29	19	14	15	15	92	
S. G. Williams ..	Norong	Dundee ..	29	19	14	15	15	92	
G. T. Bulleid and J. Hiskins	Norong North ..	Waratah ..	30	18	15	14	15	92	
G. T. Bulleid and J. Hiskins	"Bulleid's" Rutherglen	Waratah ..	29	18	15	14	14	90	
R. G. Chandler and S. P. Diffey	Springhurst ..	Free Gallipoli	29	17	14	14	14	88	
G. Webb	Rutherglen, No. 1 ..	Baldmin ..	26	19	15	14	14	88	
E. Chandler	Lilliput, No. 1 ..	Waratah ..	27	18	14	13	14	86	
R. G. Chandler ..	Lilliput	Free Gallipoli	26	17	15	14	14	86	
T. Fisher	Browns Plains, No. 1	Bobin ..	22	19	15	15	14	85	
E. Chandler	Lilliput, No. 2 ..	Free Gallipoli	23	18	14	14	14	83	
G. Webb	Rutherglen, No. 2 ..	Ranee ..	18	19	15	14	15	81	
T. Fisher	Browns Plains, No. 2	Waratah and Dundee	18	18	15	14	14	79	

Marketing of Primary Products

Activities of Marketing Boards under the Victorian Marketing Primary Products Act

A brief summary of activities of Marketing Boards operating in Victoria, obtained from reports submitted to the Minister of Agriculture, the Hon. E. J. Hogan.

THE MAIZE MARKETING BOARD OF VICTORIA.

THE Maize Marketing Board of Victoria was constituted on 2nd November, 1936, under the provisions of the *Marketing of Primary Products Act* 1935, and it commenced operations by handling the 1937 crop as from the 1st May, 1937.

Prior to the advent of this Board, the maize-growing industry was in a bad way. Maize buying had virtually become a monopoly, one firm of brokers acting for the majority of the large buyers.

Orderly marketing undoubtedly has remedied that. Growers, united under Board control, have become one seller, and indiscriminate selling by growers has been eliminated.

Since its inception, the Board has functioned continuously and successfully. The first crop handled by it (1937) produced a net return to growers of 4s. 10d. per bushel, country railway station. The Board has paid the following prices to maize growers for red yellow maize at country stations:—

	Per Bushel.
	s. *d.*
1937-38	4 10
1938-39	4 2½
1939-40	4 6
1940-41	5 2¾

During the five years 1931 to 1935 inclusive, the Victorian Maize Growers' State Committee estimates that the average return per bushel at country stations was 3s. 6d.

The cost of administration of the Board has never exceeded one penny per bushel for each crop; that is, for each season. As against this charge of one penny per bushel, the average additional return to growers over the past four seasons, compared with the years 1931 to 1935 inclusive, prior to the advent of the Board, is no less than 1s. 2¼d. per bushel.

The rate of commission paid by this Board to its agents is 2½ per centum, compared with 5 per centum paid by the growers prior to the Board's advent.

After payment of its administration costs the Board returns to growers a price based on country railway stations, over 6d. per bushel, in excess of that received by New South Wales growers at the railhead. Selling costs through the Victorian Board are lower than in Sydney, where maize is sold on the open market.

First advances paid by the Board have exceeded the full average price obtained by the grower prior to the establishment of the Board, and in one instance the first advance was 1s. per bushel higher.

The Board is producer-controlled in the fullest sense, there being five members (all maize growers), four of whom are elected by maize growers and one, the Government representative, is also a maize grower.

Although provision is made in the Victorian legislation to enable growers to have a poll for the dissolution of a Board after it has been in operation for two years, no such poll has been asked for by maize growers, indicating growers' satisfaction with the Board's activities.

THE VICTORIAN DRIED FRUITS BOARD.

Early in its history, the dried fruits industry encountered trouble through lack of an orderly marketing system. Disorganization amongst growers was so bad that the first five years of

the industry saw growers hawking their fruit amongst the merchants, and having to accept prices as low as 1½d. per lb. for raisins delivered in Melbourne.

Pioneer growers then established the Mildura Raisin Trust, which appointed two firms to sell their fruit at specified prices. About the same time the Renmark growers established a similar trust in South Australia. In 1904, these two bodies amalgamated as the Australian Dried Fruits Association, which set out to organize the marketing of the product in the whole of Australia.

Under this method the industry continued to expand until 1911, when production exceeded the requirements for Australian consumption. The Association met this position by declaring a percentage of the crop that should be exported to markets which, because of the competition with fruits produced in cheap labour countries, were less remunerative than the Australian market. Every grower member of the Association exported his specified quota, and thus helped to maintain orderly marketing in Australia.

By the end of 1912, however, other dried fruit areas at Merbein and Nyah came into bearing and production expanded considerably. In the following year trouble was caused by growers outside the Association selling the whole of their fruit in the Australian market, leaving the Association growers to carry the whole of export surplus.

With the outbreak of war in 1914 there was an increased demand for dried fruits, and for the ensuing few years prices in the overseas markets were higher than in Australia, and growers outside the Association disposed of the whole of their fruit on the more remunerative export markets.

At no time during the period when overseas prices exceeded those in Australia did the Australian Dried Fruits Association take advantage of the position by raising prices to the Australian consumer. The usual Australian price level was maintained during this period.

After the last war, Federal and State Governments undertook the repatriation of large numbers of returned soldiers in the dried fruits areas, especially in Victoria and South Australia, and, with these new soldier settlement areas coming into bearing in 1924 and 1925, an enormous expansion in the Australian production of dried fruits took place, thus adding greatly to the tonnage for which an export market had to be found.

Added to this was the post-war re-entry of Smyrna, the Levant, and other southern European countries into dried fruits production and export, with an inevitable fall in world prices.

During 1924 prices dropped by nearly one-half, and the industry was again in a perilous position. Once more growers outside the Australian Dried Fruits Association sold the whole of their fruit on the home market and, with the greatly increased Australian tonnage, it became clear that the industry would be faced with chaos unless legal authority could be provided for its organized marketing scheme to ensure that all growers would have to take their fair share of the overseas market.

The Victorian Government, seeing the gravity of the position, passed the Dried Fruits Act, under which a Board (the majority of which are elected by the producers themselves) was set up in 1925 and clothed with the essential statutory authority for the maintenance of the principle of orderly marketing. Similar Boards were established in New South Wales, South Australia, and Western Australia.

One of the powers conferred upon the State Boards was to determine the maximum proportion of dried fruit which may be marketed by each grower within the Commonwealth.

The determination of prices and terms and conditions upon which dried fruits were to be sold within Australia still remained with the Australian Dried Fruits Association after the establishment of the Boards.

Subsequently it was determined that the powers of each State to control the movements of fruit must be confined within the limits of the State, and, consequently, the Commonwealth Government, in 1928, passed supplementary legislation to control the interstate movements of dried fruits. This legislation later was declared invalid by the Privy Council, and once again the industry was threatened with chaos.

As evidence of the allegiance of growers and those engaged in the industry to the principle of orderly marketing, during the year

following the Privy Council's decision, a voluntary agreement was entered into between the Australian Dried Fruits Association and other firms not in the Association, including the Independent Growers' and Packers' Association of South Australia, under which all parties agreed, *inter alia*, to observe the quotas prescribed by the State Boards.

This voluntary agreement, which had the support of 98 per cent. of the industry, provided an opportunity for the State Governments to amend their Acts.

With the enactment in 1938 of new uniform legislation by the States concerned, the industry was once more relieved from anxiety and enabled to proceed along the road of comparative prosperity which has marked its history since the inauguration of orderly marketing.

In addition to deciding the quota determinations for each season's crop and safeguarding the orderly marketing principle, the Dried Fruits Board has many other duties, particularly for the protection of producer and consumer:—

(1) The policing of the industry to ensure that all dried fruits are processed in a registered packing house and correctly labelled by retailers.

(2) The enforcement of a strict grading system to ensure that growers receive the grade to which they are entitled for all fruit delivered at the packing house door.

(3) The maintenance of an efficient inspection system to ensure that all fruit, before being released from a packing house, has been correctly graded, marked, and processed under hygienic conditions.

Some idea of the importance of the dried fruits industry and of its progress under organized marketing may be gained from the fact that, when the first statutory Board was established in 1925, the peak production of dried fruits in Australia was 45,000 tons. In 1940 the production exceeded 100,000 tons.

The value of the industry to Australia is obvious to any one who has visited Swan Hill, Mildura, Red Cliffs, Merbein, and Renmark (S.A.), an area which was once a sheep-walk, but which to-day, with its 60,000 acres of green vineland and its chain of prosperous towns, comprises one of the best examples of successful closer settlement in the world.

Of the several thousand growers engaged in the industry, the great majority are returned soldiers, and the average holding of each settler does not exceed 20 acres. Mildura district, with an average rainfall of 10½ inches, has a population of 20,000 people within the irrigation settlement, with a home to every 16 acres.

In Victoria there are 31 packing houses and practically the whole of their plant, machinery, &c., is manufactured in Australia. As well as supporting a large number of producers, the industry provides permanent and seasonal employment for a great many men and women, and practically all employees in the industry are receiving Arbitration Court award rates of pay.

The large sum of money expended by the Government in drainage and other works is a public responsibility, and organized marketing is essential, so that the settlers may have a reasonable chance of repaying the Governments and thus relieving the general taxpayer.

Critics of Marketing Boards insinuate that they are detrimental to the producer, and also to the consumer, who, it is alleged, has paid increased prices. In the dried fruits industry, the indictment, as far as the producer is concerned, is answered in the comparison drawn herein between his present satisfactory position and that which he occupied before the establishment of orderly marketing, when he was compelled to hawk his fruit and sell it at unpayable prices.

The indictment, as far as the consumer is concerned, is also unwarranted, as shown by a comparison of the prices of varieties of dried vine fruits appearing in the lists of the Australian Dried Fruits Association.

From the table shown on the next page of the Association's prices for the five-year period immediately preceding the establishment of the Board, and also for the five-year period ending 1940, it will be seen that the average basic prices as determined by the Association for these fruits for the five-year period ending 1940 are considerably lower than those which obtained in the pre-Board five-year period.

These Association prices are the charges to the wholesaler, and it is upon these that the eventual price to the consumer is based. There has been a considerable reduction of price to the public since the institution of the Board.

The Victorian Dried Fruits Board involves no charge upon Consolidated Revenue. Its upkeep is provided entirely by a contribution paid by the growers.

PRICES OBTAINING FOR DRIED FRUITS, FOR THE YEARS SET OUT IN MARGIN.

	Currants (3 Crown.) A.D.F.A. Price.	Sultanas (3 Crown.) A.D.F.A. Price.	Lexias (4 Crown.) A.D.F.A. Price.
	d.	*d.*	*d.*
1920	8¾	10¾	9
1921	8¾	10¾	9
1922	8¾	10¾	9
1923	7⅛	11¼	8½
1924	7	8¾	6¼
A.D.F.A. Average Price	8·075	10·45	8·35
1937	7	7	5¼
1938	7½	7½	5⅝
1939	7½	7½	6⅛
1940	7¾	8	6⅛
1941	8⅛	8⅜	6⅜
A.D.F.A. Average Price	7·575	7·675	5·9

There is complete unanimity amongst growers as to the benefits they have derived since the establishment of the Board, and the industry stands 100 per cent. behind it.

THE CHICORY MARKETING BOARD.

When the Chickory Marketing Board was formed in April, 1936, the depression years had brought consumption to a low level, and prices were correspondingly low. There was no organization to regulate production, distribution, or prices. When the *Marketing of Primary Products Act* was passed in 1935, chicory growers petitioned the Minister of Agriculture, asking that a poll should be held to decide whether a Marketing Board should be formed for their industry. This poll was held in March, 1936, and 74 per cent. of growers voted in favour of a Chicory Marketing Board, which was duly constituted in April of that year, and comprised two producer representatives and a Government nominee.

In an attempt to secure some degree of stability until the Board was formed, a voluntary pool had been instituted about nine months earlier. The best price offering at this time was £17 per ton; some sales were made as low as £11 per ton, and sales were difficult, to effect even at these low figures. The voluntary pool held stocks at approximately 430 tons of dried chicory. Merchants also held considerable stocks, and when the Board commenced operations the 1936 crop was ready to be harvested. A heavy yield was obtained from this crop, both in Victoria and South Australia, so that, from all sources, 1,300 tons of chicory were available. The previous year's consumption for the Commonwealth had been under 500 tons.

The Board had to carry several hundred tons of surplus stock over to the next season. Great difficulty was experienced in obtaining the finance necessary to pay advances to growers prior to its sale, but, thanks to the untiring efforts of the Minister of Agriculture, this was eventually arranged, and a first payment of £17 per ton was made to growers, on the carry-over from the 1935 crop and on the 1936 crop.

The next difficulty experienced by the Board came from the growers opposed to orderly marketing. They refused to carry any share of the surplus chicory, and marketed the whole of their crops through interstate channels, at prices considerably below those fixed by the Board.

Board members visited South Australia, and arranged with growers there for co-operation between the two States, to secure stability of prices and regulation of supplies.

The Victorian growers who refused to co-operate with the Board, to a large extent, nullified the operation of this agreement, as they consistently contracted to sell chicory interstate at prices well below the Board price.

Notwithstanding this, a sufficient number of growers remained loyal and enabled the Board to stabilize a price which would return to growers the cost of production, plus a reasonable working profit.

The result is that the industry to-day is in a sounder position than ever before in its history.

Prices obtained for the various seasons' crops, as set out on the following page, show clearly what would have resulted if the system of disorderly marketing had not been superseded by an orderly marketing system, as conducted by the growers' Marketing Board.

While the greater part of the interstate sales were made by forward contracts, a relatively small percentage of spot sales was made at

Season.	Price Obtained by Chicory Marketing Board.	Price Obtained by Growers who made forward Interstate Contracts on the open market.
	£ s. d.	£
1936 ..	18 0 8	25 per ton
1937 ..	20 0 0	From 22 to 25 per ton
1938 ..	40 15 0	25 per ton
1939 ..	51 2 9	25 „ „
1940 ..	47 13 10	30 „ „
1941 ..	50 0 0†	50 „ „
	†(1st Payment only.)	

prices approximating Board prices. In respect to the 1936 and 1937 Board returns, storage and interest costs were heavy, and deterioration caused considerable loss on these two crops. Board prices shown are net, whilst interstate contracting prices are subject to 2½ per cent. commission deduction. The 1941 pool is as yet incomplete; £50 per ton was the first payment received by growers. A final payment will be made when the season is completed.

A poll of growers was held in 1938, and again in 1940, and on each occasion approximately 65 per cent. of growers voted for continuance of the Board.

Present chicory prices are not due to war conditions; they are the same as those ruling in July, 1939, and are due to the fact that the industry is reaping the advantage of organized marketing.

The Board has for some time been negotiating overseas regarding the sale of chicory; a trial shipment is now being exported, and there is every indication of an export trade being opened up.

Another benefit chicory growers receive under Board control is in the purchase of bags and chicory seed. These are bought wholesale by the Board, and supplied to growers at the lowest possible cost. Also, arrangements are made for growers to obtain advances for weeding and harvesting purposes, £5 an acre being available for either purpose.

The result of producer control of the chicory industry has been to lift it from bankruptcy to a profitable and expanding industry. This has only been possible through the Government, in the first place, providing the legislation necessary for the growers to establish their Marketing Board, and to the active and able assistance available at all times from the Minister of Agriculture and officers of his Department.

THE ONION MARKETING BOARD.

In 1933 onion production in Victoria totalled 41,000 tons, and many growers were unable to dispose of their crop, although sales were made at as low as 7s. 6d. per ton. The wholesale price at Melbourne, inclusive of freight and merchants' charges profit, ranged from £1 14s. 1d. to £3 12s. 4d. per ton. That was the last experience of onion growers with the "Open Market."

In 1934 a voluntary pool known as the Victorian Onion Corporation was formed, and in that year and in 1935 a large number of growers disposed of their onions through this organization.

The scheme was partially successful, and during its operation wholesale prices at Melbourne ranged from £3 16s. 11d. to £6 19s. 6d. per ton, on a total production of 46,000 tons for the two years.

A poll of producers was taken, and in April, 1936, the Onion Marketing Board was formed under the Marketing of Primary Products Act,

In 1936, 1937, and 1938 the Onion Marketing Board took delivery of the onions immediately they were harvested.

In 1936 all onions were disposed of by the Marketing Board at a satisfactory price. Growers delivered to the Board 16,816 tons, of which 14,929 tons were sold, the total net proceeds from the sales being £130,814. Net return per ton on sales averaged £8 15s. 3d., and the net return on deliveries £7 6s. 10d. per ton.

In 1937 there was a phenomenally heavy crop. Growers delivered to the Board 44,136 tons of onions, on which they received an advance of £5 per ton on the whole crop. The Board was able to sell only 23,203 tons, net proceeds being £145,349. Net returns on sale of 23,203 tons averaged £6 5s. 3d. and net return on deliveries of 44,136 tons £3 4s. 6d. per ton.

In 1938 the Board did not commence operations until April, after 92 per cent. of the growers had indicated by written agreement that they would market their onions through the Board. Prior to the completion of these agreements 11,000 tons of onions had been sold on the open market, the average gross return being only £2 15s. 6d. per ton. After orderly marketing was again established in April, the Board sold 17,000 tons at an average selling price of £7 3s. 6d., and was

able to pay the growers an average of £3 3s. per ton on the total quantity of 37,192 tons delivered to the Board that year.

In 1939 the crop was a failure, and to augment local supplies onions had to be imported from overseas. Production in Victoria totalled about 10,000 tons, of which 7,000 tons was marketed by the growers through wholesale agents approved by the Board. Prices ranged from £18 to £25 per ton.

In 1940 all sales were again made through merchants approved by the Board, 22,000 tons being marketed in this way, and growers received prices ranging from £3 10s. to £10 10s. per ton.

In 1941 the co-operation of the Federal Government was sought, and as a result prices of onions have been fixed by the Commonwealth Prices Commissioner.

VICTORIAN DAIRY PRODUCTS BOARD.

The Victorian Dairy Products Board, which operates under the Dairy Products Act of December, 1933, consists of five members, representing consumers, producers, co-operative and proprietary factories, and one nominee of the Minister of Agriculture.

From 1st July, 1935, to 30th June, 1941, its operations have covered dairy products to the value of approximately £60,000,000, while the cost of administration has been only ·35 pence per cwt.

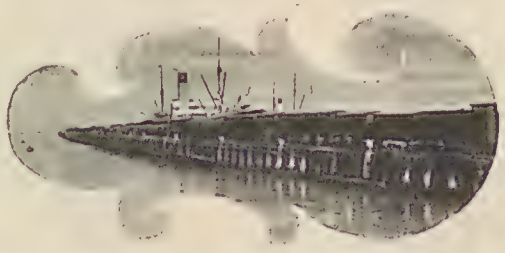
The economic position of the dairying industry of Australia is influenced materially by the measure of control exercised by producers over the marketing of dairy products. The Victorian Dairy Products Board is not a marketing Board, but, in determining monthly intra-State quotas fixed in conformity with other States, it ensures that a manufacturer shall not sell locally more than the quota determined. In such circumstances it is obvious that the big incentive to local price cutting is removed.

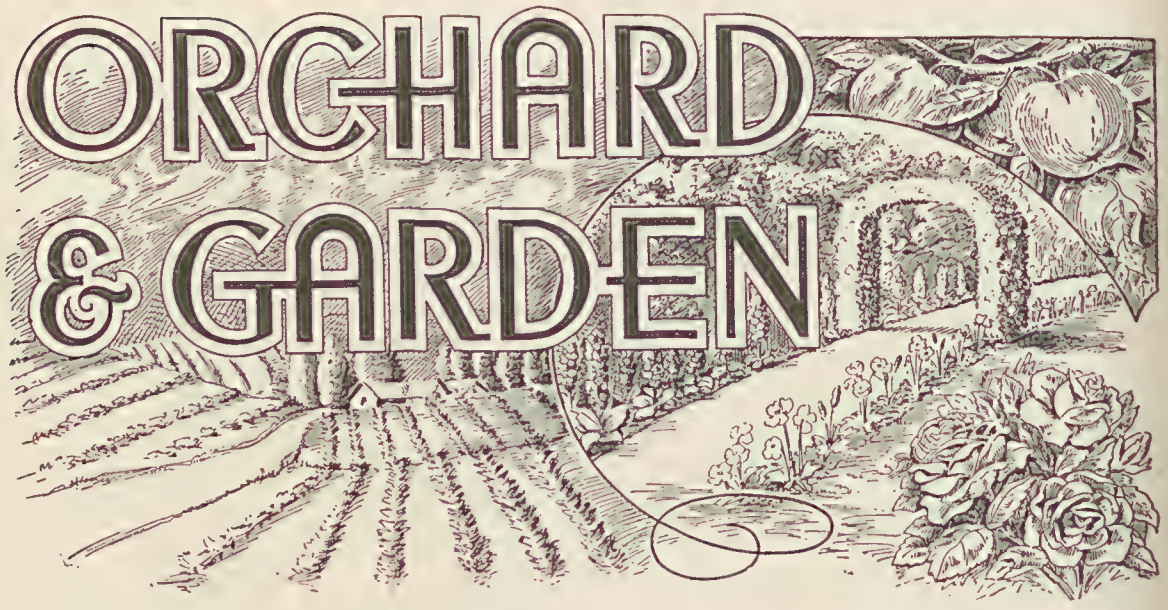
The State quota legislation does not purport to control prices in any form, but merely obliges every manufacturer to accept the principle of sharing markets equitably. The way is thus paved for the industry itself to work out and maintain a plan that involves local price stability, and this is done in the form of the present equalization system. This system is operated by a committee fully representative of the industry, and whose paramount function is the fixation of prices for equalization purposes, and the equalization of rates of returns to manufacturers irrespective of where their dairy products may be sold.

The plan has been of advantage to dairy farmers, and to butter and cheese manufacturers, from a monetary standpoint, in that in each of the years during which it has operated, it has, by stabilizing local values, returned considerably larger payments to them than would have resulted had local values been governed by export parity.

Maintenance of the Australian policy of protection of her industries involves a material contribution from the dairy farmers of the Commonwealth, and it is now generally conceded that in return they are entitled to stable values for that part of their output that is sold on the Australian market.

The Commonwealth Government set up the Australian Wheat Board, the Wool Board, and the Apple and Pear Board, but these Boards are administered by the Commerce Department of the Commonwealth. They are not functioning under the Victorian Marketing Act.





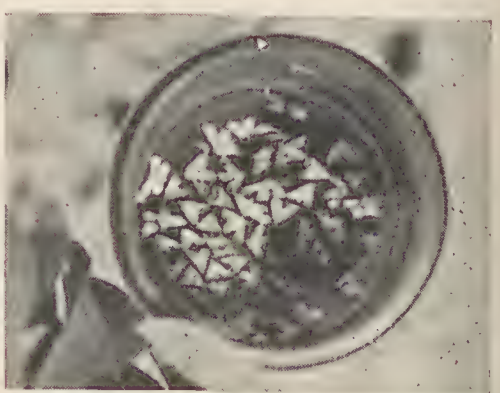
In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer

MARCH, "season of mist and mellow fruitfulness" is one of the busiest months in the fruitgrower's calendar. The main crop of apples will be harvested, and for the Jonathan, the most widely grown variety in the State, the time of picking is of major importance. Experiments have shown that in cool store, the fruit is susceptible to disorders such as soft scald and breakdown if picked when over mature. The correct picking stage can be recognized when the "ground colour" of the skin, i.e., the colour where no blush has appeared, changes from the green of the unripe fruit to the yellowish-green of fruit approaching maturity. Colour charts, which are available free of cost on application to the Department of Agriculture, enable growers to readily determine when their apples are at the correct picking stage.

The Codling Moth.

The codling moth usually causes considerable damage to apple and late pear crops during March. Because of the present labour shortage and the large number of men required for harvesting, there is a tendency for spraying to be neglected at this time of the year. A deterrent additional to spraying is the building up of a heavy arsenical residue caused by a lead arsenate spray just prior to harvesting. Therefore, growers put away their spray pumps and hope that the cover already present on the fruit will be sufficient to protect the fruit until it is picked. Should a period of moth activity occur, however, numerous eggs will be deposited, and small "stings" will appear on otherwise clean fruit. It is false economy to neglect spraying at such a time, because the few pence spent may save at least a case of fruit per tree.



Codling moths trapped in lure during peak activity.

Provided it is timed according to activity as indicated by lure catches, a spray of white oil 1 in 80 will prove particularly effective and will obviate the difficulty of a large arsenical residue which would follow an application of lead arsenate. In the warmer districts where codling moth control is a difficult problem, some growers make a practice of applying a white oil spray immediately prior to harvesting because it has been noticed that fruit, apparently clean, becomes damaged in the packing shed through the hatching of eggs present on the fruit before it was picked.

Green Manuring the Orchard.

Because of the shortage of artificial fertilizers, green manuring will assume a greater importance this season. The ability of leguminous plants together with bacteria present in nodules on their roots to "manufacture" plant food from atmospheric nitrogen makes this type of crop particularly valuable, especially to citrus growers amongst whom the shortage of sulphate of ammonia is likely to be felt more than with other fruitgrowers. Provided that a large bulk of greenstuff is obtained for ploughing under in the spring, green manuring is capable of contributing large amounts of nitrogen to the soil. Other factors include the de-watering of wet soils, breaking of the hard pan by use of tap-rooted species, soil-erosion control in hill districts and beneficial effect on soil structure.

In order to secure a satisfactory bulk of plant material, the following points should be remembered :—

Sow the Crop Early.

The importance of early sowing lies in the fact that the soil retains sufficient warmth to enable the young plants to make some headway before the winter cold brings growth to a standstill. Growers in northern irrigation districts are able to water the crop after planting and therefore are independent of the autumn break in the weather. In southern districts, the crop should be planted as soon as sufficient rain falls in late February or March. The practice of sowing every alternate land enables this work to be done without seriously interfering with harvesting operations.

Choose the Right Type of Plant.

Leguminous plants are the best to use because of their higher nitrogen content. For northern districts, tick beans, dun peas (1½ bushels per acre), or fenugreek (30 lb. per acre) have proved satisfactory. In southern districts, tick beans, dun peas, and mixtures such as peas and barley (¾ bus. and ½ bus. per acre respectively), oats and tares, or oats and peas produce good crops. In cooler hill districts, such as Stanley in the north-east or Red Hill in the south, success has been obtained by the use of ryecorn and tares.

Apply the Correct Type of Fertilizer.

In northern areas, superphosphate at the rate of 2 cwt. per acre produces a sufficient bulk of material. For southern apple and pear growing orchards, the use of a combination of super. and sulphate of ammonia has been found to produce substantial increases over the use of super. alone. Liming, either with slaked lime (1½ tons per acre) or ground limestone (2 tons per acre), has also produced increased yields and should be considered if results have been unsatisfactory in the past. The effect of liming should last three to four years.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

MARCH is a good month for planting out seedlings for winter and spring flowers. The soil is still warm and the plants establish themselves quickly, and there is less risk of sudden heat waves injuring the young seedlings. The following seedlings may be planted out this month :—Iceland poppy, stock, antirrhinum, pansy, cineraria, and the winter-flowering sweet pea.

Dahlias and Chrysanthemums.

Dahlias are flowering profusely, and occasional applications of liquid manure will be found beneficial. Dead flowers should be removed.

Chrysanthemums should be tied up and encouraged to grow steadily by attention to manuring and watering. If aphis appears, use

a spray of nicotine sulphate, one tablespoonful to two gallons of water. The addition of a small quantity of soft soap will aid the wetting properties of this spray and increase its effectiveness. Often, it is necessary to repeat the spray application to thoroughly control this insect.

Mildew on Roses and Delphiniums.

Dewy evenings and the moister atmosphere of March encourage the development of mildew on roses and delphiniums. As soon as the powdery-looking fungus is noticed on the foliage, dust with flowers of sulphur (ordinary powder sulphur). Dusting early on a dewy morning which is followed by a bright, sunny day will give the best results.

Spring Flowering Bulbs.

Preparation for the spring flowering bulbs must now be made. The shorter-growing bulbs, Muscari (grape hyacinth), Lachenalia (the Cape cowslip—commonly called Soldiers), Zephyranthes carinata (Flower of the West Wind), and freesias, may be used as border plants or placed in groups near the front of the beds. They should be planted about 2 inches deep, and, if a good border effect is desired, double or triple rows will give the desired effect. Of the Muscari, the variety "Heavenly Blue" is the most popular, and is valued for the bright blue colour it gives to the garden in spring. The yellow Lachenalia (*L. aurea*) and L. tricolor, with yellow and green and red bells, are very bright and easily grown. L. quadricolor, with its purple edge on the red, green, and yellow flowers, is more unusual. This latter variety makes a nice subject for growing in a bowl, to be brought inside when the flowering shoots appear. Freesias have been greatly improved in recent years, and a wide range of colours is now available in this sweetly-perfumed flower.

Throughout the summer, the canna beds have been adding a bright splash of colour in the garden. These hardy plants are not generally as popular as their usefulness demands. In the past, the tall-growing varieties were often too large for the suburban garden, but now that dwarf and medium varieties are available, they can be used with very good effect, with perennial phlox and dahlias, to provide a mass of colour during February and March. A very wide range of colours from ivory and cream to rich fiery crimson and scarlet can now be obtained. Gardeners should inspect these blooms now and take a note of the names of the varieties they favour, so that orders can be placed in the winter.

VEGETABLE GROWING.

Broad Beans.

Broad beans may be planted this month to provide a nutritious winter vegetable when other types of beans are not available. Prepare the soil by digging in well-rotted stable manure over which has been sprinkled a light dressing of superphosphate. Broad beans do well in a medium or heavy soil, providing it has been well prepared. Plant the seed 1 to 2 inches deep and 6 to 8 inches apart in single rows which are about 3 feet apart. During the light cultivation which should be given at frequent intervals, draw the soil up to the plants. Good drainage, of course, is essential. **Early Long Pod** ("Leviathan") will be found a good yielding variety and **Broad Windsor** is also popular. **Cole's Dwarf Prolific**, which does not grow more than about 2 feet high, is preferred by many home gardeners. To provide a continuous supply of beans, monthly sowings may be made until June.

Onions.

Seed of **Early White Queen** onion may be sown this month, but later varieties should not be sown yet. Onion seed should be sown in a seed-bed well prepared by the addition of well-rotted manure and a little blood and bone dust. After sowing, the soil should be made firm with the back of the spade. Keep well watered, and do not let weeds compete with the young plants. Onion seed does not retain its viability for a long period; therefore fresh seed must be used to ensure a good germination.

Sweet Corn.

Sweet corn is increasing in popularity in the home garden. The cobs mature during February and March, but many growers are at a loss to know when they are fit to pick. This can be determined simply by picking a cob and stripping the enfolding sheath off it. If the individual grains are plump and well-coloured, depending upon the variety, and the tip is well developed, the cob is ready to be cooked, and cobs of similar size can be harvested. Usually mature cobs are about 2 inches in diameter (or a little over 6 inches in circumference), and the tassels are brown and withered when the cobs are mature. They should be picked before the corn has had time to harden; otherwise they are not so palatable. Cook only for a very short time—about ten minutes.

Wimmera Wheat Crop Championship

Report of the Judge—A. B. HACKWELL, B.Agr.Sc., Agricultural Instructor

THE 1941 Wimmera Wheat Crop Championship was won by Mr. V. H. Baldock, of the Kaniva district, with a crop of Magnet variety grown at Serviceton. The certified yield was 45.7 bushels per acre.

Mr. Baldock's entry was an outstanding exhibit and a particularly good crop for the season.

The Championship was conducted by the Farm Competitions Association and the Royal Agricultural Society, which donated £40 prize money for the winner, and £10 to the local Society producing the champion crop. The contest was for the best 50 acres of wheat grown on ordinary one-year fallow, and was open to crops exhibited in the local competitions held by agricultural societies in the Wimmera.

A total of 150 crops was entered in the eight local competitions, and the exhibitors whose crops represented their district in the Championship were as follow:—

Society.	Exhibitor.	Variety.
Dimboola ..	A. C. Jorgensen	Free Gallipoli
Donald ..	H. E. Bath ..	Ghurka
Jeparit ..	W. G. Rodda ..	Magnet
Kaniva ..	V. H. Baldock ..	Magnet
Minyip ..	J. L. King ..	Ghurka and Quadrat
Murtoa ..	B. A. Petering ..	Ghurka
Nhill ..	P. Bone ..	Ghurka
Warracknabeal	Mrs. B. A. Hewitt and Sons	Ghurka

Over the Wimmera as a whole a good season had been experienced and a substantial harvest was garnered. In most parts the rains were well distributed throughout the growing period and were above average in amount. Many crops, however, had been affected in some degree by rust. Most serious damage from the disease occurred mainly in the northern sector, in the Netherby-Lorquon-Jeparit area.

At some centres the wheat made very prolific growth, and, except for the losses through rust, which varied considerably, the yields would have been exceptionally heavy.

On the other hand, some crops were affected through deficient rainfall at critical periods. This was especially so on the central plains (Horsham-Murtoa-Dimboola), where many crops received a pronounced check with dry weather in August and, in the absence of soaking spring rains, they returned only moderate yields.

Mr. Baldock's crop had made splendid growth and was very dense, with well-developed heads. It showed practically no weeds and only a slight infection of rust. The crop was grown on heavy black land which, after a year under grass, was summer-fallowed in 1940 and worked several times with a scarifier and shearharrows. It was sown in mid-June with 75 lb. of dry pickled seed per acre, and had been well manured with 110 lb. of superphosphate and 7 lb. of zinc sulphate per acre. The response to zinc sulphate on this paddock was very pronounced. The crop had not been grazed with sheep. The rainfall in the growing period (June to November) at this centre was 12 inches, the total for the year being 20 inches.

Several of the other entries were of a very even standard, yielding from 12 to 13 bags per acre. The exhibits of Messrs. B. A. Petering (Murtoa), J. L. King (Minyip), A. C. Jorgensen (Dimboola), and Mrs. B. A. Hewitt and Sons (Warracknabeal), were of special merit. They were well-grown, fairly dense and clean, and returned very good yields.

Mr. H. E. Bath's exhibit of Ghurka, which represented the Donald Society, had been grown under less favorable conditions than the above entries. The crop was dense, but short in the straw as growth had been checked through dry weather. However, a moderately good yield was indicated. The entries of Messrs. P. Bone (Nhill), and W. G. Rodda (Jeparit) were commendable, particularly as the effects of rust were more severe in these two zones than in the other competing districts.

PASTURE INVESTIGATIONS—*continued from page 118.*

that the plots receiving potash in addition have been showing increasingly larger responses each year, and it appears that owing to the initial better soil fertility on this plot than on plot VI., it has withstood the continued mowing longer without showing marked ill-effects.

TABLE 7.—MANURIAL TRIALS, COBDEN.—(L. VAGG).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2K.	P2Ca.	P2KCa.	P2NK.	K.
Spring—1935	174	215	239	216	236	214	173
Year—							
1936	157	257	300	258	284	282	146
1937	133	205	270	211	260	246	119
1938	61	148	197	155	200	190	68
1939	87	198	317	193	310	289	93
1940	22	75	172	73	162	167	25

The results shown on Table 8 were obtained on a pasture which had been frequently cut for grass hay prior to the experiment being commenced. From the outset this plot has shown a marked response to superphosphate and potash and a very meagre response to either superphosphate alone or superphosphate and lime. Potash alone has shown an appreciable response, but the effect of superphosphate and potash has been outstanding.

TABLE 8.—MANURIAL TRIALS, COBDEN.—(J. ERREY).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2K.	P2Ca.	P2KCa.	P2NK.	K.
Spring—1935	64	75	95	66	101	110	86
Year—							
1936	97	120	219	113	253	226	144
1937	84	98	158	96	184	175	127
1938	46	59	101	51	127	124	65
1939	96	101	215	96	245	215	150
1940	37	35	127	35	141	146	67

Both the new Colac plots (Tables 9 and 10) have shown good responses to superphosphate alone, but very much greater increases where potash also has been applied.

TABLE 9.—MANURIAL TRIALS, COLAC WEST.—(J. MCRAE).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2K.	P2Ca.	P2KCa.	P2NK.	K.
Spring—1935	82	163	187	158	180	174	90
Year—							
1936	125	293	359	298	341	317	139
1937	74	133	167	140	169	158	78
1938	32	69	96	74	117	97	36
1939	117	203	308	224	370	277	132
1940	33	60	93	62	115	90	36

TABLE 10.—MANURIAL TRIALS, LARPENT.—(N. WATCHORN).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2K.	P2Ca.	P2KCa.	P2NK.	K.
Spring—1935	107	111	117	111	117	116	106
Year—							
1936	173	244	301	235	278	270	188
1937	130	175	233	172	257	219	150
1938	34	64	128	60	140	123	40
1939	165	242	365	221	367	361	191
1940	50	64	146	64	139	144	59

PASTURE IMPROVEMENT WORK IN GIPPSLAND.

Results of Major Plots.

Although the Gippsland area includes a great variety of soils and pastures, it is on account of its rainfall that it differs most markedly from the rest of the State. East Gippsland is the only portion of Victoria that receives sufficient summer rain to ensure summer growth, and though near-East Gippsland has a rather low rainfall, and is better suited for cropping and sheep grazing than for dairying, Central Gippsland has the most liberal and reliable rainfall of any agricultural district in Victoria. In this, the most important part of Gippsland the rainfall varies from 30-50 inches per annum, and though the late summers are usually dry as in other parts

of the State, the autumn and spring rains are usually reliable and sufficient to promote good growth. Winter cold and heavy rains retard growth during the winter period, but except for the flats, which do become very wet, most of Central Gippsland is hilly and well drained, and does not become water logged.

Most of the dairying districts in Central Gippsland were originally heavily timbered, and the natural grazing value very low. After clearing and burning, vigorous pastures were readily established by broadcasting seed on the burn. Of the sown grasses, cocksfoot was outstanding in vigour of growth, and red clover (or "cow grass") grew so well as to be termed the "Lucerne of Gippsland."

These pastures did not maintain their early vigour indefinitely, and where dairying was practised, it soon became necessary to supplement the pastures with cropping. Despite the deep soils and liberal rainfall, the pastures had declined greatly in vigour at the time pasture top-dressing with superphosphate became general in Victoria, and weeds such as blackberries, bracken fern, ragwort, and the sheep's burr had become increasingly troublesome.

Top-dressing with superphosphate soon showed that many of the Gippsland pastures could be greatly improved by such treatment, and the Pasture Improvement League work was started in order to ascertain if other fertilizers might also be of value, and if pasture management or the introduction of other species might further improve the growth.

Major plots were established on "Older Basalt" red hill country at Warragul and North Mirboo, and on the grey Jurassic hill country at Korumburra. At Yarragon and Toora similar plots were established on grey silty flats, while at Caldermeade the plots were located on dark fertile flat land on the fringe of the Koo-wee-rup swamp. In addition to the above major plots, a number of observational pilot plots were established throughout the hill, flats, and rising country of Central Gippsland.

A good response to superphosphate was soon obtained on trials on the flats and on the grey hill country, but the plots situated on the red hill country at Warragul and North Mirboo showed a poor response to superphosphate alone, although a good response was obtained where lime and sulphate of ammonia was applied in addition. Further trials that were subsequently established showed that a good response to lime is general in the North Mirboo district. At Warragul, however, the new mowing plots did not respond to liming, but small grazing plots established south of Warragul have shown an excellent response, where lime and sulphate of ammonia were used in addition to superphosphate. The new Warragul mowing manurial plots did not show a satisfactory response to superphosphate even when lime was also applied, and it was only when potash was applied in addition to the superphosphate that satisfactory results were obtained.

TABLE 11.—MANURIAL TRIALS, CALDERMEADE.—(J. DAVIS).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	196	297	293	287	290	310
1933 ..	124	238	233	256	249	261
1934 ..	194	360	321	341	345	395
1935 ..	285	503	494	477	526	502
1936 ..	238	465	433	445	472	475
1937 ..	203	301	304	310	326	318
1938 ..	41	118	126	141	140	125
1939 ..	298	384	369	378	383	369
1940 ..	76	124	128	137	151	128

TABLE 12.—MANURIAL TRIALS, KORUMBURRA.—(F. E. KURRLE).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	158	190	197	224	207	209
1933 ..	68	135	129	165	145	155
1934 ..	149	252	211	261	241	265
1935 ..	118	202	173	207	201	211
1936 ..	148	246	228	251	254	270
1937 ..	112	224	212	228	249	247
1938 ..	43	114	105	119	130	128
1939 ..	150	242	225	236	244	251
1940 ..	94	201	175	210	197	224

TABLE 13.—MANURIAL TRIALS, WARRAGUL.—(C. TYSSEN).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	81	89	97	126	102	96
1933 ..	49	55	71	89	77	58
1934 ..	87	111	105	126	113	125
1935 ..	59	108	76	115	90	113
1936 ..	87	151	116	134	160	159
1937 ..	40	51	47	60	67	68
1938 ..	10	18	25	39	36	25
1939 ..	61	131	96	126	141	148

TABLE 14.—MANURIAL TRIALS, MIRBOO NORTH.

Yields in cwt. of Greenstuff per acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	87	104	119	130	124	109
1933 ..	65	80	92	116	97	87
1934 ..	89	94	105	136	91	105
1935 ..	57	61	67	99	74	67
1936 ..	15	22	21	32	26	29

TABLE 15.—MANURIAL TRIALS, TOORA.

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	209	248	257	262	268	264
1933 ..	159	215	211	219	233	225
1934 ..	219	324	306	328	329	342
1935 ..	199	279	276	274	299	286
To 13.10.36	63	94	81	80	85	107

TABLE 16.—MANURIAL TRIALS, YARRAGON.

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.	P2NCa.	P2NK.	P3.
1932 ..	145	197	194	200	200	196
1933 ..	120	200	196	219	209	216
1934 ..	117	219	203	239	211	222

The subsequent work on some of these plots has shown very large increases in pasture growth following on applications of potash fertilizers. The potash responses have been most marked on soils that have been "cropped out" or after the pasture has been mown for some years without any equivalent return of animal droppings.

It will be seen from these results that there is much conflicting evidence as to the most effective fertilizer to use on the red hill country of Gippsland. In most parts of Victoria the response of pastures to superphosphate is rapid and spectacular, but in these Gippsland trials on the red older basalt soils the response has been meagre and slow and by no means comparable with that usually obtained in other areas. Superphosphate has usually eventually achieved a very substantial improvement on the pastures of the Gippsland red hill country, but the results are often slow. The poor response of these soils has recently been investigated by Mr. G. W. Leeper, of the Agricultural School of the Melbourne University, and the findings of this work seem to provide the explanation of the abnormal behaviour of these soils. Previous investigations made by the Agricultural Research Chemist had provided a satisfactory explanation of the responses of various soils to potash and lime, but the position with regard to phosphate had remained obscure. Although this new work on the soil phosphates does not yet provide any practical means of overcoming the soil's inability to respond to phosphatic fertilizers, it will be most valuable if it can serve as a guide as to whether other fertilizers are required or if it is the composition of the soil that renders the phosphate ineffective.

In Gippsland, the rainfall is usually sufficient to maintain most perennial species, and except on some of the peaty areas, annual weeds and grasses are not troublesome. Under these circumstances soil fertility is the all important factor in determining the nature and vigour of pasture growth. It is certainly necessary to have suitable pasture species present to make use of the soil fertility conditions offering, but so long as the fertility of the soil is maintained, the pasture species in Gippsland will almost look after themselves. The winter growing annual grasses are not troublesome in this area, and Yorkshire fog and *Agrostis* Spp. the bent grasses, and rib grasses and flat weed are the most common weeds in Gippsland pastures. During the spring, Gippsland

The spring surplus pasture growth permits mowing for silage.

pastures grow with great vigour and if allowed to grow unchecked soon become rank and coarse.

As might be expected, the cutting of surplus spring growth either for silage or grass hay is here a most important phase of pasture management, and the harrowing of pastures to spread animal droppings is more widely practised in Gippsland than in any other area of the State.

In Gippsland the development and maintenance of soil fertility is the most important aspect of pasture improvement, and while superphosphate is the basis of all pasture manuring, both lime and potash have been found to be serious limiting factors in certain areas.

TABLE 17.—MANURIAL TRIALS, WARRAGUL.—(C. J. SNAPE, now T. BOARDMAN).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.*	P2NCa.	P2Ca.	NCa.*	Ca.
1936 ..	188	224	205	228	229	181	163
1937 ..	97	128	127	132	131	95	81
1938 ..	20	46	53	50	42	24	19
1939 ..	106	155	154	122	121	103	100
1940 ..	45	72	..	61	58	..	66

TABLE 18.—MANURIAL TRIALS, LARDNER.

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.*	P2NCa.	P2Ca.	NCa.*	Ca.
1936 ..	235	233	232	221	226	218	208
1937 ..	121	102	120	122	113	115	102
1938 ..	27	24	37	43	34	40	28
1939 ..	105	112	119	122	119	123	103
1940 ..	50	57	..	63	73	..	52

TABLE 19.—MANURIAL TRIALS, WARRAGUL.—(C. TYSSEN, No. 2).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.*	P2NCa.	P2Ca.	NCa.*	Ca.
1936 ..	127	200	209	238	225	134	127
1937 ..	75	163	142	163	175	72	78
1938 ..	24	85	83	90	90	26	17
1939 ..	56	124	115	121	132	67	57
1940 ..	52	100	..	103	105	..	49

* After August, 1940—P2N plots changed to P2K; NCa plots changed to P2CaK.

TABLE 20.—MANURIAL TRIALS, MIRBOO NORTH.—(EDNEY BROS.).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.*	P2NCa.	P2Ca.	NCa.*	Ca.
1936 ..	131	228	213	239	246	152	154
1937 ..	82	142	140	177	188	82	75
1938 ..	20	63	66	93	93	26	19
1939 ..	62	189	169	240	262	81	66
1940 ..	25	121	..	142	156	..	27

TABLE 21.—MANURIAL TRIALS, MIRBOO NORTH.—(L. J. AUSTIN).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.*	P2NCa.	P2Ca.	NCa.*	Ca.
1936 ..	105	156	148	206	201	140	156
1937 ..	55	86	82	122	115	78	78
1938 ..	19	43	43	63	55	31	31
1939 ..	76	140	123	161	163	93	91
1940 ..	33	84	..	101	105	..	45

TABLE 22.—MANURIAL TRIALS, LIMONITE.—(G. W. BICKERTON).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Season.	Nil.	P2.	P2N.*	P2NCa.	P2Ca.	NCa.*	Ca.
1936 ..	189	229	238	322	332	221	218
1937 ..	157	193	185	272	287	169	153
1938 ..	42	63	64	96	97	46	50
1939 ..	93	150	128	204	229	110	106
1940 ..	48	78	..	91	94	..	43

* After August, 1940—P2N plots changed to P2K.
NCa plots changed to P2CaK.

PASTURE IMPROVEMENT IN THE NORTH-EAST.

As one proceeds from south to north in Victoria, the rainfall declines greatly, but towards the North-East a high rainfall is still enjoyed. As a consequence, Northern Victoria is mainly devoted to cropping, and although there is still a large area of light carrying capacity grazing land, pastures are largely incidental to cropping. The dry area extends eastwards to the Melbourne-Albury road and railway, but to the south-east of this line, amongst the hills, there are extensive creek and river valleys, which enjoy a considerably higher rainfall, and on which dairying can be practised.

It was in order to investigate the possibilities of pasture improvement in this class of country that new experimental pasture plots were established at Benalla, Wangaratta, and Kiewa in 1938.

The chief pasture difficulties that the North-East district suffers is the paucity and irregularity of rain in the drier areas and low soil fertility in most of the wetter areas.

At Kiewa soil moisture conditions are favorable for the maintenance of perennial pasture species, but at both Benalla and Wangaratta, summer conditions are rather severe for the persistence of most productive perennial species. Further up the valleys better rainfall conditions are experienced and here perennial rye grass can usually be maintained without difficulty. In the drier parts of the area soil fertility conditions are fairly good, but good responses to superphosphate can be obtained in the years of good rainfall.

In the wetter portions of the area the soils are generally much poorer and are very responsive to top-dressing with superphosphate.

In the drier area the good soil fertility and warm winter conditions are favorable for the growth of the winter growing weeds and grasses, and given favorable rains these grow very vigorously when stimulated by top-dressing with superphosphate. Fortunately subterranean clover grows well under these conditions, but it has to contend with vigorous competition from cape weed, crowsfoot, barley grass, silver grass, soft brome, and the sterile brome, all of which are very inferior pasture species.

Subterranean clover can hold its own against these plants fairly well, but perennial rye grass has difficulty in withstanding such competition, particularly in view of the severity of the long summer period. Wimmera rye grass and *Phalaris tuberosa* have so far proved to be the most promising species for growing in association with subterranean clover in these areas, the former on account of its annual habit and winter growing ability, and the latter for reason of its good drought resistant qualities. On the Benalla and Wangaratta mowing plots

subterranean clover is by far the most conspicuous species on the strips receiving superphosphate, while the unmanured strips still retain a considerable amount of the native danthonia, and the subterranean clover plants on them are weak and unthrifty. Despite the usual deficiency of rain in this area it is seldom that the ground is sufficiently dry in the late winter and early spring to check all growth, and it is owing to the ability of "sub. and super." to promote increased growth during this brief period that pasture improvement has achieved considerable success. In favorable years the improved pastures grow much more strongly in the autumn, winter, and early spring, but in dry years when growth is almost completely checked by drought, the increased growth is restricted to the early spring. Though this period may not be long, the increased growth made during such time is most valuable.

The yields obtained from the Benalla and Wangaratta plots in 1939 and 1940 illustrated how greatly production may fluctuate according to seasonal conditions, but they also show that while in a dry year the growth on all plots is poor, the relative increases due to manurial treatment are greatly magnified.

These plots have only been mown for two years, and superphosphate continues to give an excellent response, and as yet, there has been no material response to lime or potash. Lime has occasionally appeared to have been of some value on the grazing plots, and it is probable that as the mowing and depletion of potash progresses that potash may show some material response. So far the responses to superphosphate have been so outstanding that it would not appear worth while to encourage expenditure on any other form of fertilizer. The yields from plots receiving the 3 cwt. per acre of phosphates have recently been consistently lower than those of the superphosphate 2 cwt. per acre plots, and it appears that in the drier areas of the North-East the rainfall is not sufficiently heavy to justify dressings of superphosphate in excess of 2 cwt. per acre.

The natural unimproved pasture land in the North-East consists of (1) unbroken native pasture consisting mainly of danthonia and other persistent native species, and (2) of land which has been cropped and on which the native grasses have been temporarily destroyed. The cropped land often shows a residual benefit from the previous top-dressing, and the pasture consists mainly of trefoils and weedy annual grasses.

Subterranean clover is the outstanding species for pasture improvement work in the North-East, but it is desirable that useful grass species should also be grown with the subterranean clover in order to prevent the intrusion of the unwanted annual inferior grasses.

Throughout this area, dry conditions during the autumn make the establishment of pastures

Phalaris tuberosa and sub. clover make a good combination.

very uncertain, and this condition has no doubt retarded the more general adoption of sown pastures throughout the area.

Perennial rye grass might be expected to hold on the lower damp areas where the soil should contain a higher proportion of clay. On most of the red friable soils the perennial rye can only be expected to survive until the first severe summer, and on such soil either Wimmera rye grass or *Phalaris tuberosa* should be useful. Both of these species, could together with subterranean clover, be readily established with an oat crop or on the oat crop stubble. It is unfortunate that in most cases the cropped land is merely allowed to revert to pasture without any of the better pasture species being introduced. Even a very small quantity sown at the same time as the crop would provide the beginning of an improved pasture.

TABLE 23.—MANURIAL TRIALS, BENALLA.—(W. J. PEARSON).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Year.	Nil.	P½.	P1.	P2.	P2K1.	P2K1Ca.	P2Ca.	P3.
1939	288	354	401	429	423	434	420	421
1940	18	49	65	81	86	101	82	77

TABLE 24.—MANURIAL TRIALS, WANGARATTA.—(S. D. WEBB).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Year.	Nil.	P½.	P1.	P2.	P2K1.	P2K1Ca.	P2Ca.	P3.
1939	253	341	408	477	486	484	468	501
1940	43	86	132	179	188	176	158	172

TABLE 25.—MANURIAL TRIALS, KIEWA.—(I. S. WALLACE).

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Year.	Nil.	P½.	P1.	P2.	P2K1.	P2K1Ca.	P2Ca.	P3.
1939	194	236	262	313	295	299	296	305
1940	170	208	250	297	295	289	273	272

PASTURE IMPROVEMENT IN THE LILYDALE DISTRICT.

The Lilydale District is climatically well-suited for the maintenance of permanent pastures. In past years it was noted for the good pastures on the flats of the river Yarra, but more recently a good deal of pasture improvement work has been undertaken on the poorer shallow soils on the rising country. In an unimproved condition this land carried a poor pasture of danthonia and kangaroo grass, but assisted by top-dressing with superphosphate productive pastures of perennial rye, cocksfoot, and white and subterranean clovers can be maintained.

Two mowing manurial trials have been established at Coldstream and Yering in the Lilydale district in order to investigate the response of the pastures to fertilizers.

Considering the very obvious responses to pasture improvement which are usually so conspicuous in this district, it is at first sight rather surprising that the responses to superphosphate have been so small.

The soils are rather low in fertility, and are evidently deficient in elements other than phosphates. At Coldstream both lime and potash when applied in addition to the superphosphate have effected a marked increase in yield, but at Yering while potash has given a marked increase in growth, there is little to be seen from the lime.

Small grazing manurial trials which have been established on an improved pasture at Coldstream also show only a small response to superphosphate, but an excellent response where both superphosphate and potash have been applied. Cement works precipator dust, a waste product carrying approximately 10 per cent. K_2O, has shown a very good response on several trial strips in the district.

Obviously in this district the maintenance of soil fertility is of paramount importance, and providing this is kept at a satisfactory level, both rainfall and the climatic conditions affecting the survival of perennial pasture species, are sufficiently favorable to enable very productive pastures to be developed. Bent grass (*Agrostis* sp.) and Yorkshire fog are the two most troublesome weed grasses in the district. The over-grazed and under-fertilized pastures tend to develop an excess of bent grasses, while the pastures that are insufficiently grazed develop an excess of Yorkshire fog.

TABLE 26.—MANURIAL TRIALS, LILYDALE (Yering).—J. W. READE.

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Year.	Nil.	P½.	P1.	P2.	P2K1.	P2K1Ca.	P2Ca.	P3.
1939	280	295	318	326	358	398	362	326
1940	116	127	133	138	180	196	138	134

TABLE 27.—MANURIAL TRIALS, LILYDALE (Coldstream).—J. P. DOAKE.

Yields in cwt. of Greenstuff per Acre.

Total Annual Yields.

Year.	Nil.	P½.	P1.	P2.	P2K1.	P2K1Ca.	P2Ca.	P3.
1939	217	222	231	241	269	303	287	258
1940	68	72	87	96	115	172	138	104

Irrigated Pastures

Trials in the Goulburn Valley and Northern Irrigation Areas

By G. B. RAYNER, B.Agr.Sc., Assistant Agrostologist

Irrigated pasture trials are being conducted by the Department of Agriculture in conjunction with the Victorian Pasture Improvement League at Swan Hill, Stanhope, Cohuna, and Tongala. A description of the layout of these plots, the methods employed in measuring the yields of the manurial sections, and the results already achieved have been recorded in the earlier reports. When mowing was commenced in 1938, it was decided to divide each experimental area into two halves, and to mow and graze each for alternate periods of two years; therefore, the results for the 1940–41 season which are presented in this report, represent the yields obtained during the first year of mowing those sections of the plots which had been grazed during the previous two years.

The plots mowed in 1940–41 were identical in size and number with those mown in 1938–39 and 39–40; except at Cohuna, where there are five sections, three of which were cut during the first two seasons, and two during the season under review.

At all centres the unmanured plot swards have deteriorated markedly since the trials began. The growth of white clover is now much weaker than on the top-dressed plots, and inferior species such as couch grass (*Cynodon dactylon*), pigeon grass (*Setaria* spp.), and *Paspalum distichum* have appeared on the unmanured plots. The species trials at Cohuna and Swan Hill have not altered appreciably during the past year. The Cohuna trial is now mainly a uniform sward of perennial rye grass and white clover, with some cocksfoot and strawberry clover, and only odd plants of other species still persist. White clover has spread over the whole of the Swan Hill species trial, but while red clover and lucerne persist, tall fescue and phalaris are still dominant on the strips on which they were sown.

Swan Hill (A. Douglas).

The most noteworthy feature of these plots during the 1940–41 season has been the increase in yield obtained from 6 cwt. of superphosphate. This is the first season in which a marked response has been obtained from the application of this fertilizer in excess of 4 cwt. per acre. There was a progressive increase up to 3 cwt. of superphosphate, an extra hundredweight made no difference to the yield, but a further 2 cwt. of manure gave an extra 9.1 cwt. of dry matter. This represents the equivalent of over half a ton of air-dried hay for the cost of 3 cwt. of superphosphate, and as such represents a profitable increase in yield. Lime again was the only material other than superphosphate to show any promise. The addition of 10 cwt. of lime, or 10 cwt. of lime, plus 1 cwt. of ammonium sulphate, to 2 cwt. of superphosphate gave an appreciable increase in yield; but this was equalled by the addition of an extra hundredweight of the phosphatic manure, which would be a more economical practice. Ammonium sulphate was of no value as a supplement to superphosphate, and there is still no indication of any response to potash.

An excellent mixed pasture under irrigation.

Stanhope (E. Hadfield).

The Stanhope plots have the same lay-out, and comprise the same manurial treatments, as those at Swan Hill. Here superphosphate was the only manure to give a response, and other materials applied in addition to 2 cwt. of superphosphate did not effect any increase in yield, nor was any benefit derived from the application of superphosphate in excess of 2 cwt. per acre. The sward on these plots has considerably improved since mowing began, white clover has rapidly increased at the expense of subterranean clover and lucerne, which were the dominant legumes when the experiment was commenced. The development of white clover is much stronger on the manured plots than on the unmanured strips.

Cohuna (G. Major).

It will be seen from the accompanying table in which the yields are all expressed in hundredweight per acre, that the Cohuna plots continued to be the most productive; and it is considered that here an ideal perennial pasture has developed. The portion of the experimental area which was not mowed during the 1940–41 season recorded a carrying capacity of 1.3 cattle, plus 4.4 sheep per acre per annum.

A good response was obtained from superphosphate with progressive increases up to 4 cwt. per acre. The splitting of 4 cwt. of superphosphate into two applications of 2 cwt. —one in the spring and one in the autumn— appears to have effected an increase in production; whereas during the first two years of mowing this practice brought about a depression of yield. However, although the layout of the plots does not lend itself to a statistical analysis of the figures, it is considered that the difference of 3.7 per cent. between the two "superphosphate 4 cwt." plots is too small to be significant.

Lime is applied to the appropriate plots at Cohuna at the rate of 1 ton per acre every five years; it was last applied in the autumn of 1939, and during the subsequent mowing season no response was obtained. During the following season (1940–41) there was an increase in yield from the plots which had received lime in addition to the annual dressing of 2 cwt. of superphosphate; this increase was equal to that obtained by the annual application of an extra 2 cwt. of superphosphate. If a lime response of this magnitude were to be sustained over the five years between dressings, it would compare favorably from the economic point of view with the application of extra superphosphate. There has been no evidence that liming has improved the botanical composition of the sward, and it does not appear to have affected the palatability of the pasture. No effort has been made to determine the effect of lime on the chemical composition of the pasture plants.

Tongala (J. Bullingham).

The results from the plots at Tongala for the 1940–41 season did not differ very much from those for the previous two years, except that the strips which received lime and gypsum in addition to 2 cwt. of superphosphate gave a relative increase in yield and equalled the "superphosphate 4 cwt." plots. Lime and gypsum were applied in the autumn of 1939, and there was a response during the following year, although not as great as that obtained from extra superphosphate. During the first year of mowing (1938–39) there was a good response to lime—which was applied five years before—and no response to gypsum. The three years' results indicate that the use of these soil amendments in addition to superphosphate may be worthy of consideration, although the best that can be said for this practice so far is that although it has equalled, it has not improved on the result from the liberal application of superphosphate alone.

RESULTS OF MANURIAL TRIALS ON IRRIGATED PASTURE AT SWAN HILL, STANHOPE, COHUNA, AND TONGALA, 1940–41.

Summary of Total Yields Obtained per Acre.

Manurial Treatment per Acre per Annum.	Cwt. Dry Matter per Acre.			
	Swan Hill, 26.6.40–8.7.41.	Stanhope, 24.6.40–9.7.41.	Cohuna, 27.6.40–7.7.41.	Tongala, 25.6.40–9.7.41.
	cwt.	cwt.	cwt.	cwt.
No manure	55·5	54·9	82·8	57·7
Super. 1 cwt.	66·2	52·7	90·7	67·7
Super. 2 cwt.	71·0	65·7	94·0	69·3
Super. 3 cwt.	78·4	65·8	..	..
Super. 4 cwt.	77·3	62·0	99·8	78·1
Super. 4 cwt. (two applications)	..	..	103·5	77·3
Super. 6 cwt.	87·5	66·2	..	..
Super. 2 cwt. + amm. sulph. 1 cwt.	70·1	64·4	..	..
Super. 2 cwt. + pot. sulph. 1 cwt.	71·2	59·3	88·9	70·7
Super. 2 cwt. + amm. sulph. 1 cwt. + pot. sulph. 1 cwt.	72·5	65·4	..	..
Super. 2 cwt. per annum + lime 1 ton every 5 years	..	..	102·3	78·5
Super. 2 cwt. per annum + gypsum 1 ton every 5 years	..	..	95·5	80·3
Super. 2 cwt. + lime 10 cwt.	78·0	58·2	..	..
Super. 2 cwt. + gypsum 10 cwt.	74·9	61·6	..	..
Super. 2 cwt. + amm. sulph. 1 cwt. + lime 10 cwt.	78·6	60·3	..	..
Bone Fertilizer 2 cwt.	..	..	91·8	67·1

Blind or Stomach Staggers

Blind or stomach staggers is a complaint which affects horses, the symptoms being sudden blindness, colicky pains and a staggering gait. It is caused by eating mouldy food, such as grain that has become damp, and more especially soiled bedding. As a rule horses will not eat food of this description, but when their diet has been deficient in mineral matter the appetite becomes perverted and they will pick up and eat various kinds of rubbish. At the onset of the attack the patient has what appears to be an attack of colic, but when on its feet it may stagger and run into walls, fences, &c., showing that the eyesight has become affected. In this condition the animal is very apt to injure itself, and may have to be restrained. The most important line of treatment is to get the bowels emptied as soon as possible.

A veterinary surgeon will be able to do this in a few minutes with suitable drugs, administered by means of a hypodermic syringe. If the services of a veterinarian are not available, the following drench should be given:—

Calomel, 1 dram; turpentine, 2 oz.; raw linseed oil, 1 pint.

This is the dose for a light horse, but up to double the quantity can be given to a large draught horse. Copious enemas of warm, soapy water should be administered, as this will assist the bowels to act more quickly. When the cause has thus been removed, the eyesight will rapidly return to normal.

Standard Herd Records

For Quarter ended 31st December, 1941

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 243, of which 165 qualified for the certificate. The figure in brackets after the owner's name shows the number of entries.

The amount of butter-fat required for qualification varies with the age class to which the animal belongs, the standard being as follows:—

Junior 2-year-old (under 2½ years at time of calving)	230 lb. butter-fat.
Senior 2-year-old (between 2½ and 3 years at time of calving)	250 lb. butter-fat.
Junior 3-year-old (between 3 and 3½ years at time of calving)	270 lb. butter-fat.
Senior 3-year-old (between 3½ and 4 years at time of calving)	290 lb. butter-fat.
Junior 4-year-old (between 4 and 4½ years at time of calving)	310 lb. butter-fat.
Senior 4-year-old (between 4½ and 5 years at time of calving)	330 lb. butter-fat.
Mature cow 5 years and over	350 lb. butter-fat.

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Alston, Mrs. N. B., and Sons, Romsey, Jersey (2).										
Rosyth Gay Brownie ..	59332	273	16	5,411	5·87	317·4	350	Mature	192, 295, 314, 278	Werribee Gaypiece
Rosyth Gay Rosebud 4th..	73807	273	12	5,235	5·36	280·7	270	Jr. 3	241 ..	Werribee Gaypiece
Andrew, W., Whittlesea, Ayrshire (1).										
Glenayr Garland ..	32395	273	N.C.K.	5,912	4·24	250·8	230	Jr. 2	.. ..	Kelvin Grove Lotus Lad 2nd
Atkinson, W. K., Swan Hill, Dairy Shorthorn (7).										
Willow Park Camelia 14th	520D	273	20½	10,242	3·88	397·8	350	Mature	241, 290, 376	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Camelia 35th	Vol. 2	273	8½	6,693	3·51	234·9	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 26th	1286E	273	16½	7,715	4·27	329·2	350	Mature	300, 364, 429, 430, 415	Willow Park Imperial 3rd
Willow Park Fairy 8th ..	1296E	273	24	8,444	3·99	337·1	350	Mature	279, 293, 320, 341	Willow Park Silvermine 4th
Willow Park Melba 29th ..	Vol. 2	240 (Sold)	..	8,940	3·67	328·2	310	Jr. 4	204, 346 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Melba 38th ..	Vol. 2	273	24	7,377	3·59	264·9	230	Jr. 2	.. ..	Willow Park Barrington 58th
Willow Park Moss Rose 20th	Vol. 2	273	18½	7,212	3·46	249·5	230	Jr. 2	.. ..	Wicklesham Lord Barrington 5th (Imp.)
Austin, F., Lara, Jersey (3).										
Avalon Madeira's Pansy 11th	70065	273	13	7,586	5·46	414·1	270	Jr. 3	248 ..	Mornmoot Prince Madeira
Avalon Madeira's Pansy 14th	Vol. 28	273	11½	5,660	5·38	304·4	230	Jr. 2	.. ..	Mornmoot Prince Madeira
Mornmoot Fancy Starbright 5th	68090	210 (Died)	..	4,740	5·99	284·1	250	Sr. 2	.. ..	War Valour (Imp.)
Ballarat Orphanage, Ballarat, Jersey (8).										
Banyule Silvermine 58th ..	29032	273	24	7,362	5·77	424·7	350	Mature	308, 435, 383, 388, 440	Superstrain of Banyule
Orphanage Clara 2nd ..	54575	273	22	8,592	5·63	483·8	350	Mature	325, 397, 355	Jerseylea Quality Boy
Orphanage Lady 5th ..	58817	273	16	6,335	5·75	364·5	350	Mature	339, 325, 360	Retford King Bracken
Orphanage Mannikin's Attraction	32931	273	25	7,470	5·80	433·4	350	Mature	260, 470, 358, 481, 432	Audrey's Prince of Banyule
Orphanage Maud ..	41404	273	24	7,317	5·44	398·3	350	Mature	315, 420, 373, 448, 368	Orphanage Quicksand's Prince
Orphanage Melba 16th ..	Vol. 28	273	19	7,437	5·88	437·6	250	Sr. 2	307 ..	Banyule Terraplane
Orphanage Mirthmaker 4th	49973	273	30	9,587	5·72	547·9	350	Mature	.. ..	Jerseylea Quality Boy
Orphanage Pearl 10th ..	58825	273	26	7,488	5·90	442·0	350	Mature	.. ..	Jerseylea Quality Boy
Banyule Stud Pty. Ltd. (C. G. Lyon) Heidelberg, Jersey (4).										
Banyule Molly 62nd ..	60497	273	29	9,332	5·91	551·4	270	Jr. 3	447 ..	Banyule Gipsy Moth
Banyule Silvermine 108th ..	56264	273	37½	10,026	5·50	551·0	310	Jr. 4	369, 411 ..	Banyule Triplane
Banyule Silvermine 124th ..	65347	273	22½	8,684	6·02	523·0	250	Sr. 2	.. ..	Banyule Comet
Banyule Silvermine 133rd ..	70193	273	18	5,914	6·28	371·6	230	Jr. 2	.. ..	Banyule Upcast
Bennett, J. W., Yinnar, Jersey (3).										
Ellendale Cloudy 2nd ..	66335	273	N.C.K.	6,191	5·69	352·4	330	Sr. 4	.. ..	Staghorn Bell Boy
Ellendale Duchess 3rd ..	71152	273	N.C.K.	8,736	5·58	487·2	310	Jr. 4	.. ..	Staghorn Bell Boy
Ellendale Kirsty 26th ..	66336	273	N.C.K.	11,348	5·12	580·8	350	Mature	378 ..	Staghorn Bell Boy

STANDARD HERD RECORDS—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day lb. Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Bennett, R. H., Lancefield, Jersey (2).										
Edenhope Dairymaid ..	57117	273	30	6,542	5·31	347·1	350	Mature ..	..	Byelands Royalist
Edenhope Molly Madeira ..	47928	273	22	10,388	6·40	664·8	350	Mature	451 ..	Byelands Royalist
Black, Estate Late I. S., Noorat, Ayrshire (1).										
Mount Noorat Alert 7th ..	31638	273	16½	8,502	4·53	385·5	290	Sr. 3	321 ..	Gowrie Park Scottish Major
Broad, Mrs. A. A., Sutton Grange, Jersey (3).										
Grangelea Rosebud 7th ..	48572	273	18	5,364	5·88	315·5	350	Mature	279, 374, 347, 467	Banyule Macon
Grangelea Rosebud 10th ..	66768	273	15	5,717	5·83	333·2	250	Sr. 2	251 ..	Grangelea Daffodil's Aero
Grangelea Ruby 3rd ..	66766	273	19	6,524	5·27	344·0	270	Jr. 3	328 ..	Grangelea Cream Boy
Broad, A. J., Pyramid, Jersey (1).										
Lynlea Rose Petal 2nd ..	Vol. 28	273	15	4,980	5·74	286·1	250	Sr. 2	.. ..	Grangelea Prosper 5th
Butcher, F. T., Swan Hill, Red Poll (1).										
Maryville Fay	6910A	273	17	7,221	4·01	289·7	250	Sr. 2	218 ..	Temperley Prism
Carne, W. J., Pakenham Upper, Jersey (1).										
Navulos Master's Ladybird	63365	273	23	6,908	6·30	435·1	310	Jr. 4	383 ..	Werribee Grandmaster
Chadderton, J. E., Hamilton, Jersey (1).										
Glen Leigh Dolly 3rd ..	52824	273	20	9,378	4·94	463·2	350	Mature	354, 272 ..	Glen Leigh Bounty
Chirnside, R. M., Whittlesea, Jersey (1).										
Mornmoot Golden Cream ..	72946	273	20½	7,287	5·10	371·6	230	Jr. 2	.. ..	War Valour (Imp.)
Clarke, F. W., Toora, Jersey (1).										
Mer Vue Cissie	67911	273	N.C.K.	6,459	6·28	405·6	310	Jr. 4	308, 391 ..	Mer Vue Flash Prince
Clark, P. W., Whittlesea, Jersey (4).										
Coodardy Centurion's Fascination	70824	273	9	4,317	5·84	252·2	270	Jr. 3	285 ..	Werribee Centurion
Coodardy Centurion's Gloria 2nd	70827	273	19½	7,187	5·21	374·1	270	Jr. 3	381 ..	Werribee Centurion
Coodardy Centurion's Lady	70828	273	6	4,736	5·35	253·2	270	Jr. 3	350 ..	Werribee Centurion
Coodardy Centurion's Liberty	70829	273	25½	7,068	4·73	334·0	270	Jr. 3	412 ..	Werribee Centurion
Clark, W. J., Monomeith, Jersey (3).										
Glenavon Emerald ..	66602	273	26	7,571	5·48	414·6	330	Sr. 4	.. ..	Rochett's Golden (Imp.)
Glenavon May ..	66604	273	18	7,374	4·92	362·7	310	Jr. 4	362 ..	Glenavon May Star
Glenavon Mimulus ..	Vol. 28	273	20	6,015	6·81	409·8	230	Jr. 2	.. ..	Glenavon Starbright's Airshaft
Colenso, L. W. R., Alvie, Jersey (1).										
Normandie Hawthorn 19th	Vol. 28	273	7	3,503	5·82	203·8	230	Jr. 2	.. ..	Normandie Majestic
Cook, D. E., Loch, Jersey, (3).										
Wattle Vale Bloom ..	64840	273	N.C.K.	6,527	6·09	397·3	350	Mature	.. ..	Ewelme Eileen's Northerner
Wattle Vale Janice ..	Vol. 28	273	13	4,830	5·56	268·6	270	Jr. 3	.. ..	Ewelme Eileen's Northerner
Wattle Vale Magic ..	C.R.	273	N.C.K.	3,975	4·99	198·3	230	Jr. 2	.. ..	Wattle Vale Golden Age
Coulthard, J. J., Whittlesea, Jersey (2).										
Walamba Lady	64779	273	N.C.K.	6,191	5·58	345·2	350	Mature	294, 274, 336, 422, 277	Banyule Airo
Walamba Show Girl ..	Vol. 28	210	4	2,730	5·25	143·3	230	Jr. 2	.. ..	Selsey Wonderful Boy
Cowan, G. L. S., Bacchus Marsh, Friesian (2).										
Ingolston Olga	5689	273	N.C.K.	11,798	3·43	404·9	350	Mature	.. ..	Ingolston Sylvester
Ingolston Ramona ..	5694	273	N.C.K.	10,778	3·65	393·7	350	Mature	.. ..	Ingolston Sylvester
Crawford, Mrs. E., Traralgon, Jersey (1).										
Balniel Princess Larkspur ..	70164	180 (Herd withdrawn)	..	5,632	4·86	273·8	270	Jr. 3	236 ..	Werribee War Volunteer
Cuddihy, T. D., Geelong, Jersey (2).										
Mount Violet Colleema ..	68125	273	22½	7,062	5·47	386·3	350	Mature	.. ..	Mount Violet Count Twylish
Mount Violet Collette ..	72972	273	19	6,434	5·34	343·8	250	Sr. 2	.. ..	Woodside Silver Count
De La Rue, N. C., Weering, Jersey (3).										
Balcairn Madeira ..	70124	273	18	5,619	6·05	340·2	290	Sr. 3	254 ..	Selsey Brampton Boy
Balniel Lady Fox ..	Vol. 28	273	13	5,324	5·49	292·5	290	Sr. 3	208 ..	Pine Grove Duke
Lucerne Vale Madeira 3rd ..	49243	273	21	9,296	5·60	520·9	350	Mature	283, 335, 441, 546, 410	Lucerne Vale Grandmaster

STANDARD HERD RECORDS—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Devon Park Stud Farm (G. E. Daley) Lilydale, Jersey (5).										
Belgonia Design's Lady 2nd	56315	273	N.C.K.	7,524	5·26	396·0	270	Jr. 3	312, 261, 373	Design's Ruler (Imp.)
Glen Iris Royal Chance ..	71420	273	N.C.K.	6,383	5·47	349·3	270	Jr. 3	323 ..	Glen Iris Royal Gallant
Karrara Inspiration ..	Vol. 28	273	N.C.K.	4,893	5·88	287·8	230	Jr. 2	.. ..	Brampton Great Boy (Imp.)
Karrara Perree's Music ..	Vol. 28	273	N.C.K.	7,217	5·90	425·7	250	Sr. 2	.. ..	Springhurst Perree's Quality
Karrara Tecoma's Eve ..	Vol. 28	273	N.C.K.	5,777	6·49	374·8	230	Jr. 2	.. ..	Karrara Christmas Eve
Dennis, Mrs. A. A., Frankston, Jersey (1).										
Ballam Laura	65285	273	22	7,314	4·99	364·9	250	Sr. 2	358 ..	Somerville Preference
Department of Agriculture, Werribee, Friesian (2).										
Victoria Choral	Vol. 15	273	21	6,305	3·97	250·5	230	Jr. 2	.. ..	Anema Netherland Neptune
Victoria Ilkabelle ..	6087	273	22	10,467	3·87	404·6	350	Mature	384, 429, 522	Victoria Double Top
Department of Agriculture, Werribee, Red Poll (9).										
Victoria Amethyst ..	Vol. 11	273	19	5,931	5·05	299·6	290	Sr. 3	284 ..	Victoria Donald
Victoria Gloriosa ..	Vol. 11	273	21½	7,773	4·54	353·1	290	Sr. 3	.. ..	Victoria Donald
Victoria Pepita	6027A	273	29	9,203	4·66	428·6	350	Mature	370, 406, 419	Woodburn Peter Pan
Victoria Petersham ..	Vol. 11	273	22	7,713	4·24	327·4	230	Jr. 2	.. ..	Victoria Robin Hood
Victoria Persephone ..	Vol. 11	273	23	8,661	4·75	411·6	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Philopena ..	6028A	273	28	10,982	4·00	439·8	350	Mature	317, 366, 329	Woodburn Peter Pan
Victoria Rosebloom ..	Vol. 11	273	22	7,350	4·49	329·7	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Wildwood ..	6036A	273	17	9,561	4·03	385·4	350	Mature	353, 317, 325	Woodburn Peter Pan
Victoria Whirlwind ..	7030A	273	34	12,309	4·17	513·4	330	Sr. 4	330, 408 ..	Victoria Goblin
Dookie Agricultural College, Dookie, Ayrshire (2).										
Dookie Laburnum ..	33480	273	22	6,338	3·87	245·1	230	Jr. 2	.. ..	Gowrie Park Bonnie Sailor
Dookie Sappho	23672	273	12½	5,243	4·77	249·9	350	Mature	451, 423, 545, 565, 584, 746, 666	Dookie Beau
Dunmore, T. J., Melton, Jersey (1).										
Laura Dell Beth ..	72359	273	14½	4,581	6·64	304·1	250	Sr. 2	.. ..	Avalon Gladstar 34th
Eltringham, W. B., Lilydale, Jersey (1).										
Clifford Farm Diana ..	70726	273	30	8,574	5·37	460·1	290	Sr. 3	429 ..	Clifford Farm Danny Boy
Everist, F. R., Tyabb, Red Poll (2).										
Chota Wallah Lady Ann ..	Vol. 11	273	N.C.K.	3,995	3·99	159·6	230	Jr. 2	.. ..	Blackwood Mopoke
Gipps Glanetta	C.R.	273	N.C.K.	6,407	3·68	236·0	270	Jr. 3	.. ..	Blackwood Butler
Fadersen, J. H., Mandurang, Jersey (1).										
Banyule Molly 59th ..	56257	273	N.C.K.	4,970	6·05	300·9	310	Jr. 4	358, 387 ..	Banyule Biplane
Fairchild and Clutterbuck, Tinamba, Jersey (4).										
Fairbank Butterfly 2nd ..	57253	273	N.C.K.	7,322	5·47	400·4	350	Mature	270, 330 ..	Wompini Beau Brummel
Selsey Lotus 3rd ..	73880	273	N.C.K.	7,641	5·19	396·5	270	Jr. 3	341 ..	Brampton Son of Champions (Imp.)
Vaucluse Princess ..	55699	273	N.C.K.	6,146	5·81	357·0	350	Mature	253, 364, 325, 429	Paisley Master
Vaucluse Trilby	69525	273	N.C.K.	7,607	5·94	452·2	310	Jr. 4	326, 442 ..	Glen Iris Violin
Fixter, A., Boisdale, Guernsey (2).										
Avonview Buttercup 2nd ..	6725	273	20	6,737	5·11	344·2	310	Jr. 4	325, 290 ..	Kentdale Monogram
Avonview Julie	8275	273	12	4,373	5·58	244·2	230	Jr. 2	.. ..	Kentdale Monogram
Foster, A. O., Boisdale, Jersey (8).										
Boisdale Brunette 5th ..	60686	240	4	3,645	5·59	203·9	330	Sr. 4	188, 250 ..	Wompini Master Grey
Boisdale Dame 3rd ..	C.R.	273	10	4,322	4·80	207·6	250	Sr. 2	.. ..	Boisdale Masterpiece
Boisdale Dolly 3rd ..	70394	273	18	5,019	5·53	277·5	270	Jr. 3	210 ..	Boisdale Masterpiece
Boisdale Fuchsia 5th ..	C.R.	273	N.C.K.	3,597	5·48	197·2	230	Jr. 2	.. ..	Boisdale Masterpiece
Boisdale Madge	C.R.	273	N.C.K.	3,414	5·28	180·1	230	Jr. 2	.. ..	Boisdale Masterpiece
Boisdale Natty 3rd ..	65513	273	N.C.K.	3,710	6·27	232·6	310	Jr. 4	177, 178 ..	Wompini Master Grey
Boisdale Netta 4th ..	C.R.	273	N.C.K.	3,440	5·66	194·6	230	Jr. 2	.. ..	Boisdale Masterpiece
Boisdale Twilight 3rd ..	70396	273	N.C.K.	4,371	5·62	245·7	270	Jr. 3	226 ..	Boisdale Masterpiece
Gay, R. G., and Son, Yarram, Jersey (2).										
Elm Grove Silvershine ..	71183	273	23	6,536	6·03	393·8	270	Jr. 3	290 ..	Gold Star of Melrose
Elm Grove Songstress ..	Vol. 28	273	22	6,275	5·33	334·2	230	Jr. 2	.. ..	Gold Star of Melrose
Grice, C. S., Somerville, Jersey (1).										
Tyabb Lady Pearl ..	69469	273	22½	7,058	4·98	351·7	350	Mature	319 ..	Somerville Perla

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Handbury, J. E., and Son, Toora, Jersey (3).										
Tooravale Bettws-y-Coed ..	59761	273	N.C.K.	8,285	5·85	484·9	350	Mature	402, 542, 563	Kyora Hero
Tooravale Lassie 31st ..	Vol. 28	273	14	6,119	5·91	361·7	290	Sr. 3	348 ..	Pinewood Aristrocrat (Imp.)
Tooravale Princess 23rd ..	69407	273	N.C.K.	10,386	5·41	561·9	330	Sr. 4	365, 430 ..	Pinewood Aristrocrat (Imp.)
Harvey, T., Boisdale, Jersey (13).										
Jerseyholm Bluebell 13th	40371	240	4	3,000	4·81	144·2	350	Mature	281, 381, 371, 361, 334, 328	Werribee Master Fox
Jerseyholm Bluebell 18th	44479	273	10	5,673	5·51	312·8	350	Mature	371, 433, 367, 446, 408	Werribee Master Fox
Jerseyholm Bluebell 42nd	67189	240	4	2,025	5·84	118·3	250	Sr. 2	189 ..	Rowallan Silvanite
Jerseyholm Bluebell 43rd	67190	180	4	2,970	4·14	122·9	250	Sr. 2	270 ..	Rowallan Silvanite
Jerseyholm Empress 22nd	37506	273	N.C.K.	5,334	4·37	232·9	350	Mature	344, 419, 393, 380, 328, 340, 365	Brucevale Lord Island Fancy
Jerseyholm Empress 45th	53362	273	19	7,530	4·90	368·6	350	Mature	343, 361, 447, 448	Jerseyholm Master Fox 6th
Jerseyholm Empress 53rd	57850	273	N.C.K.	3,318	4·60	152·6	330	Sr. 4	217, 290, 283	Jerseyholm Master Fox 6th
Jerseyholm Empress 61st	67194	273	N.C.K.	3,224	4·77	153·9	250	Sr. 2	254 ..	Rowallan Silvanite
Jerseyholm Empress 62nd	67195	273	7	2,706	4·79	129·5	270	Jr. 3	245 ..	Rowallan Silvanite
Jerseyholm Empress 63rd	67196	273	N.C.K.	3,188	6·21	198·1	250	Sr. 2	263 ..	Orphanage Molly's Commander
Jerseyholm Empress 66th	71970	273	18	5,396	5·59	301·7	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Lady Marge 14th	53367	273	N.C.K.	4,265	5·60	238·7	350	Mature	273, 249, 366, 323, 366	Werribee Master Fox
Jerseyholm Lady Marge 19th	71979	273	19	5,444	5·29	287·8	230	Jr. 2	.. ..	Orphanage Molly's Commander
Henderson, W., Grasmere, Ayrshire (2).										
Carracoorte Balm 17th ..	27002	150	4	4,005	4·92	197·1	350	Mature	318, 225, 259, 309, 313	Carracoorte Gerty's Producer
Carracoorte Princess 2nd ..	Vol. 34	150	4	1,635	5·11	83·5	230	Jr. 2	.. ..	Hazelmore Brown Prince
Higgins, J. A. A., Keysborough, Guernsey (2).										
Kentdale Mavis	7229	273	13½	4,526	5·32	240·6	270	Jr. 3	.. ..	Kentdale Anthony
Kentdale Myrtle	5631	273	18	4,946	4·91	242·9	350	Mature	.. ..	Kentdale Tomboy
Hodgins, G. E., Hastings, Jersey (2).										
Arlington Starbright ..	Vol. 28	273	14½	4,965	5·19	257·9	230	Jr. 2	.. ..	War Valour (Imp.)
Verjean Varrity 2nd ..	74360	273	15½	4,982	5·76	286·9	230	Jr. 2	..	Jorian Great Boy
Hore, M. T., Horefield, Friesian (7).										
Elmar Betty	Vol. 15	273	N.C.K.	7,062	3·40	239·9	230	Jr. 2	.. ..	Elmar Sylvia's Lad
Elmar Lena	C.R.	273	N.C.K.	9,358	2·82	263·6	230	Jr. 2	. .	Burnbank Iona Rock
Elmar Oaklipse .. .	C.R.	273	N.C.K.	6,288	3·19	200·5	230	Jr. 2	.. ..	Burnbank Iona Rock
Elmar Rock Keyes	C.R.	273	N.C.K.	10,306	3·29	339·4	290	Sr. 3	340 .	Burnbank Iona Rock
Elmar Trixie 2nd ..	C.R.	273	N.C.K	6,902	3·39	234·3	230	Jr. 2	.. ..	Burnbank Iona Rock
Kurrajong Multi Majoe ..	C.R.	273	N.C.K.	6,233	3·72	231·7	270	Jr. 3	254 ..	Elmar Majoe Galatea
Kurrajong Multi Majoe 4th	C.R.	273	N.C.K.	7,958	3·24	257·5	230	Jr. 2	.. . .	Burbank Iona Rock
Hurrey, Estate of the late W. H., Koonwarra, Jersey (4).										
Kooreena Carrie 11th ..	C.R.	273	16	4,806	5·86	281·5	250	Sr. 2	.. .	Kooreena Rover 3rd
Kooreena Dainty Maid ..	C.R.	273	11	5,010	6·06	303·8	270	Jr. 3	255 ..	Kooreena Good Luck
Kooreena Lady 7th ..	62,627	273	20	7,389	5·54	409·4	350	Mature	391, 394, 321	Kooreena Carrie 3rd's Halo
Kooreena Lady 13th ..	C.R.	273	11	4,191	5·73	240·1	230	Jr. 2	.. ..	Kooreena Carrie 4th's Laddie
Jeffreson, E. L., Dandenong, Jersey (1).										
Barrowby Briar Rose ..	60508	273	21	6,596	4·43	292·2	350	Mature	303, 424, 411	Barrowby Sonny
Jones, A. C., Barnawatha, Illawarra Shorthorn (5).										
Coraldale Scarlet 14th ..	24523	273	18	7,226	4·12	298·0	310	Jr. 4	213 ..	Sunnyvale David
Malvern Primrose ..	Vol. 8	240	N.C.K.	5,670	4·11	233·1	250	Sr. 2	174 ..	Avondale Theo
The Hill Muriel 13th . . .	Vol. 8	273	N.C.K.	5,822	3·72	216·6	290	Sr. 3	.. ..	The Hill Topgallant
Wangoola Renown's Lorna	Vol. 8	273	N.C.K.	5,555	4·18	232·3	290	Sr. 3	.. .	Hillview Renown's Combination
Wangoola Shamrock 5th ..	Vol. 8	273	N.C.K.	6,597	4·01	264·5	330	Sr. 4	253 ..	The Forest Posy's King
Langlands, F. B., Horsham, Jersey (1).										
Brierwood Volunteer's Lady	Vol. 28	210 (Sold)	..	3,930	5·23	205·7	310	Jr. 4	.. ..	Murona Twyliar
Linke, H. P., Tarrington, Dairy Shorthorn (1).										
Corresdean Roanie ..	Vol. 2	273	23	7,991	3·80	304·0	350	Mature	.. .	Willow Park Revenue 2nd

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day lb. Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class	Previous Yields of Butter Fat.	Sire.
Lyon, W. H., Sale, Jersey (2).										
Avon Mayflower ..	Vol. 28	273	18	5,104	6·32	322·7	270	Jr. 3	..	Avon Morning Star
Avon Princess Royal ..	C.R.	273	8	3,909	5·87	229·4	270	Jr. 3	..	Ruby's Beau (Imp.)
Macauley, C. W., Rochester, Jersey (1).										
Taranah Rarity 3rd ..	69225	273	9	5,586	5·33	298·0	310	Jr. 4	320, 385 ..	Taranah Fair Boy
McCormack, M. and Sons, Mansfield, Red Poll (1).										
Cypress Cherry Plum ..	6387AA	273	N.C.K.	7,223	4·12	297·9	230	Jr. 2	..	Northwood Prior
McErvale, I., and Sons, Camperdown, Jersey (2).										
Cummock Grace ..	Vol. 28	273	N.C.K.	6,240	5·56	347·2	310	Jr. 4	207, 302 ..	Cummock Governor General
Kameruka Ringdove ..	40472	273	N.C.K.	6,423	5·32	342·8	350	Mature	279, 380, 333	Banyule Amplifier
McKenzie, Mrs. E. J., and Sons, Woodford, Jersey (1).										
Kyora Rosedream 2nd ..	34304	273	N.C.K.	7,212	5·13	369·8	350	Mature	291, 356 ..	Miama's Volunteer of Woodside
McNab, G. A., and Son, Irrewillipe East, Jersey (10).										
Karoola Valerie	72114	273	N.C.K.	5,679	6·85	389·2	250	Sr. 2	.. ..	Glenvalley Royal Master
Maxon Chieftain's Marie 2nd	67851	273	N.C.K.	7,890	4·54	358·4	290	Sr. 3	306 ..	Maxon Count's Chieftain
Maxon Countess Light ..	49425	273	N.C.K.	9,617	5·78	555·5	350	Mature	331, 391, 427, 372, 735	Maxon Count Graceful
Maxon Count's Lady 4th ..	54019	273	N.C.K.	7,463	4·89	364·7	350	Mature	346, 375, 335, 415	Maxon Count Graceful
Maxon Handsome Estelle ..	Vol. 28	273	N.C.K.	4,110	5·96	244·8	230	Jr. 2	.. ..	Maxon Handsome Boy
Maxon Linnacre's Daisy ..	63004	273	N.C.K.	6,299	5·67	357·1	310	Jr. 4	202, 374 ..	Maxon Linnacre's Starbright 2nd
Maxon Noble's Bell ..	67853	273	N.C.K.	5,703	6·22	354·8	290	Sr. 3	302, 355 ..	Maxon Duchess Noble
Maxon Noble's Daisy 2nd ..	54025	273	N.C.K.	6,443	4·65	299·5	350	Mature	284, 369, 294	Avalon Noble 8th
Maxon Starbright's Pansy ..	Vol. 28	273	N.C.K.	5,139	5·93	304·5	230	Jr. 2	.. ..	Avalon Starbright 8th
Mornmoot Lady Starbright 2nd	68091	273	N.C.K.	5,749	6·14	353·0	230	Jr. 2	.. ..	Werribee Viceroy
Manly, R. A. A., Phillip Island, Dairy Shorthorn (2).										
Braelands Daphne Queen 26th	Vol. 2	273	17	5,494	3·69	202·8	250	Sr. 2	.. ..	Wicklesham Barrington Duke 3rd (Imp.)
River Glen Clarabelle 7th ..	Vo. 2	273	20	8,664	4·17	361·2	350	Mature	.. ..	Dorrie's Royal of Wangarra
Meaklin Bros., Mooroopna, Dairy Shorthorn (6).										
Drumneil Beauty ..	761E	273	32	10,178	4·41	448·4	350	Mature	474 ..	Willow Park Reformer
Drumneil Daisy 3rd ..	Vol. 2	273	13	9,339	3·46	323·0	330	Sr. 4	320 ..	Willow Park Lustre 3rd
Drumneil Dinah ..	Vol. 2	273	21	7,355	3·46	254·2	230	Jr. 2	.. ..	Willow Park Luste 3rd
Drumneil Ida	Vol. 2	273	21	8,688	3·98	345·5	290	Sr. 3	365 ..	Willow Park Lustre 3rd
Drumneil Princess 4th ..	784E	273	15	9,077	3·36	304·9	350	Mature	333 ..	Darbalara Bounty
Drumneil Princess 6th ..	Vol. 2	240	4	6,255	3·63	227·0	310	Jr. 4	325 ..	Willow Park Lustre 3rd
Methodist Central Mission, Lilydale, Guernsey (2).										
Melbourne Golden Waterlily	7428	273	N.C.K.	6,440	4·68	301·7	250	Sr. 2	243 ..	Nundoorah Daredevil
Melbourne Lucille ..	7445	273	N.C.K.	6,021	4·37	263·3	270	Jr. 3	192 ..	Yarraview Sequel's Slogan
Mitchell, R. H., Linton, Jersey (2).										
Clifford Farm Nina ..	70729	273	17	6,233	5·98	373·0	250	Sr. 2	.. ..	Clifford Farm Flashlight
Clifford Farm Winsome ..	Vol. 28	273	24	7,154	5·50	393·8	230	Jr. 2	.. ..	Tavistock Quality Lad
Moore, J. and Co., Yarram, Jersey (10).										
Clarendon Eyre Camille 11th	56799	273	16	5,711	4·88	278·5	350	Mature	298, 336, 477, 289	Victorious Pioneer (Imp.)
Clarendon Eyre Rose Marie 12th	56810	273	9	3,153	4·69	147·9	350	Mature	254, 229, 247	Clarendon Eyre Oxford's Gamboge
Tooloonook Molly 17th ..	Vol. 28	273	9	3,509	4·71	165·4	270	Jr. 3	223 ..	Tooloonook Sanfoin's Hero 3rd
Tooloonook Onyx ..	69299	273	16	5,121	5·32	272·2	310	Jr. 4	302, 248 ..	Rydon Premier
Tooloonook Peach 8th ..	64599	273	15	5,219	5·43	283·3	350	Mature	228, 200 ..	Tooloonook Carob's Hero
Tooloonook Peach 12th ..	Vol. 28	273	9	3,822	5·68	216·9	270	Jr. 3	193 ..	Belgonia Lady's Duke
Tooloonook Plumbago 9th	74212	273	14	5,193	5·87	304·6	310	Jr. 4	276 ..	Latrobe Musician
Tooloonook Polygold 3rd ..	74214	150	4	1,065	5·14	54·8	230	Jr. 2	.. ..	Belgonia Lady's Duke
Tooloonook Rose 2nd ..	74215	273	16	4,547	4·57	207·8	250	Sr. 2	163 ..	Belgonia Lady's Duke
Tooloonook Sanfoin 7th ..	74216	273	10	3,645	5·58	203·4	270	Jr. 3	184 ..	Belgonia Lady's Duke
Nash, L., Launching Place, Jersey (1).										
Glenome Norma ..	32889	273	N.C.K.	6,441	4·15	267·3	350	Mature	.. ..	Economist of Aveley
Nicholas, M. A., Sherbrooke, Jersey (2).										
Brampton Champion's Miss (Imp.)	56042	273	9	4,647	5·89	273·7	350	Mature	235, 273, 242	Brampton Son of Champions
Selsey Royal Lily ..	73882	273	17½	6,713	5·33	358·0	250	Sr. 2	.. ..	Selsey Right Royal

STANDARD HERD RECORDS—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Noble, T. M., and Sons, Maffra, Jersey (4).										
Finchley Countess ..	71314	273	N.C.K.	6,938	6·12	424·5	270	Jr. 3	378 ..	Finchley Masterman
Finchley Lillian	57279	273	N.C.K.	6,665	6·62	441·3	350	Mature	421, 425, 480, 452	Werribee Lord Burnham
Finchley Lillian 6th ..	Vol. 28	273	N.C.K.	5,573	6·79	378·4	230	Jr. 2	.. ..	Finchley Vasilika's Masterpiece
Finchley Master's Canary 2nd	61609	273	N.C.K.	9,885	6·15	608·3	350	Mature	343, 396, 502	Finchley Masterman
Parker, L. M., Tallarook, Dairy Shorthorn (1).										
Deepdale Cherry ..	Vol. 2	273	23	10,743	4·31	463·0	350	Mature	387 ..	Willow Park Banker
Parkes, E. F., Merton, Jersey (1).										
Irona Benedictine ..	Vol. 28	240	4	3,825	5·67	216·9	250	Sr. 2	178 ..	Irona Cute Boy
Payne, A. E. T., Lilydale, Guernsey (4).										
Yarraview Alys	6623	273	30	9,596	5·33	511·6	350	Mature	379, 430, 491	Yarraview Contralo
Yarraview Essie	5169	273	38	11,274	4·59	517·1	350	Mature	292, 346, 583, 510, 513	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Julie	3560	273	30½	12,131	5·82	706·5	350	Mature	480, 353, 580, 551, 589	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Siren ..	6643	273	30½	10,815	5·31	574·1	350	Mature	407, 520, 528	Camilla's Majestic of Maple Lodge (Imp.)
Phillips, J. H., Swan Hill, Jersey (2).										
Ryeland's Balcony Rose ..	Vol. 28	273	N.C.K.	5,030	5·81	292·4	230	Jr. 2	.. ..	Banaview Master
Ryeland's Wallflower ..	73840	273	N.C.K.	6,612	5·70	376·9	270	Jr. 3	305 ..	Banaview Master
Powell, T. S., Mansfield, Jersey (2).										
Carellen Golden Duchess ..	70638	273	23	6,564	5·26	345·0	230	Jr. 2	.. ..	Werribee Madeira's Ace
Montery Maid's Mermaid ..	58528	273	28	10,359	4·84	501·1	350	Mature	442, 439, 376, 608	Rosecliff Mariposa's Master
Read, Estate of the late J. D., Springhurst, Jersey (1).										
Springhurst Phillidora's Tomato	73930	273	16	5,815	5·92	344·4	230	Jr. 2	.. ..	Twin Oak Ashley Fern's Noble (Imp.)
Richardson, W. S., Bacchus Marsh, Jersey (1).										
Sutton Lea Pariel 5th ..	64398	273	21	6,411	5·48	351·6	350	Mature	183, 333 ..	Staghorn Prince Aldan
Smith, Bros, Mirboo North, Jersey (2).										
Sylvan Hill Countess ..	38278	273	N.C.K.	4,956	4·50	223·1	350	Mature	443, 379, 384, 367, 374, 379, 369	Somerville Heir Apparent
Sylvan Hill Thelma 2nd ..	69193	273	N.C.K.	6,365	5·62	357·5	310	Jr. 4	258 ..	Glen Iris Bow Bells
Smith, C. G., Pakenham, Jersey (2).										
Navuloa Master's Cream ..	54422	273	26	8,030	5·52	443·1	350	Mature	433 ..	Werribee Grandmaster
Selsey Ricious	50570	273	19	6,767	5·98	404·8	350	Mature	300, 316, 410	Brampton Great Boy (Imp.)
Stephens, Dr. F. G., Vermont, Guernsey (1).										
Roads End Antoinette ..	3409	273	22	6,200	4·76	294·9	350	Mature	398, 340, 303, 198	Glenburnie Ideal (Imp.)
Tait, W. G., Dreelte, Jersey (1).										
Stonybank Belladonna 2nd	73957	210 (Sold)	..	4,845	6·09	295·1	270	Jr. 3	313 ..	Design's Golden Oxford (Imp.)
Tanberg, G., and Son, Warragul, Illawarra Shorthorn (1).										
Inverlair Bebe	8159	273	29	8,457	3·44	290·8	350	Mature	.. ..	Tango of Greyleigh
Thomas and Taylor, Hamilton, Ayrshire (2).										
Carracoorte Lillian 7th ..	27012	273	27	9,662	5·32	514·5	350	Mature	341, 292, 330, 426, 385	Carracoorte Panic
Jennewar Bonnie ..	27421	273	14½	8,906	4·75	422·6	350	Mature	341, 344, 441, 400	Carracoorte Panic
Tomasetti, B. G., Drouin West, Ayrshire (3).										
Glencorren Daphne ..	33603	240 (Sold)	..	5,302	4·17	220·9	230	Jr. 2	.. ..	Glenfallock Pilot
Glencorren Edna ..	C.R.	273	22	7,140	4·24	302·9	230	Jr. 2	.. ..	Glenfallock Comrade
Glencorren Elva ..	32414	273	22½	7,845	4·90	384·3	310	Jr. 4	279, 384 ..	Scotswood Flashlight
Trowin, J. V., Nathalia, Jersey (3).										
Weir View Northern Princess	74481	273	23	5,592	4·73	264·5	230	Jr. 2	.. ..	Carellen Northern Duke
Weir View Northern Wattle	74484	273	18½	4,974	5·43	270·2	230	Jr. 2	.. ..	Carellen Northren Duke
Weir View Northern Wattle 2nd	74485	273	19	5,034	5·14	258·8	230	Jr. 2	.. ..	Carellen Northern Duke

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Tyssen, C. J., Warragul, Jersey (6).										
Hylsbroke Air Lady ..	44392	273	N.C.K.	7,031	4·72	331·6	350	Mature	.. ..	Banyule Joystick
Hylsbroke Fancy 4th ..	67051	273	N.C.K.	5,763	6·39	368·4	290	Sr. 3	... ..	Latrobe Dante
Hylsbroke Goldfinch ..	67052	273	N.C.K.	7,815	5·48	427·9	330	Sr. 4	.. ..	Latrobe Dante
Hylsbroke Larkspur 2nd ..	67056	273	N.C.K.	5,919	6·52	385·7	310	Jr. 4	.. ..	Latrobe Aircloud
Hylsbroke Marina ..	57737	273	N.C.K.	7,668	5·86	449·5	350	Mature	.. ..	Latrobe Starjoy
Hylsbroke Tiddlewinks 3rd	71842	273	N.C.K.	4,587	5·55	254·8	290	Sr. 3	.. ..	Latrobe Dante
Vaughan Bros., Girgarre, Jersey (2).										
Lynroy Beta 2nd ..	72570	273	8	6,399	5·73	366·8	350	Mature	296, 355, 358	Werribee Laverock
Lynroy Pixie 3rd ..	72577	273	14	6,372	6·47	412·0	270	Jr. 3	341 . ..	Werribee Laverock
Wade, W. J., Stratford, Jersey (5).										
Glen Iris Golden Belle ..	52814	273	N.C.K.	7,208	5·43	391·5	350	Mature	294, 229, 378	Design's Golden Oxford (Imp.)
Inverbroom Empress 2nd ..	48762	273	N.C.K.	8,385	4·60	385·6	350	Mature	350, 376, 356, 300, 288	Economist of Aveley
Inverbroom Empress 7th ..	67090	273	N.C.K.	5,568	6·92	385·2	270	Jr. 3	301 ..	Banyule Airport
Inverbroom Silver Bunty ..	53273	240 (Sold)	..	5,354	4·66	249·4	350	Mature	284, 308, 328, 280	Economist of Aveley
Inverbroom Silver Muriel 2nd	38483	273	N.C.K.	8,762	4·42	387·7	350	Mature	401, 387, 370, 276	Economist of Aveley
Walker, C. S., Swan Hill, Friesian (3).										
Warwick Colantha Empress	Vol. 15	273	N.C.K.	10,577	3·10	328·0	230	Jr. 2	.. ..	Hengest Matador Walker
Warwick Matador's Violet	Vol. 15	273	27	9,653	3·62	349·0	310	Jr. 4	294, 372 ..	Hengest Matador Walker
Warwick Violet Patch ..	C.R.	273	29	9,198	3·11	286·1	230	Jr. 2	.. ..	Hengest Matador Walker
Walker, C. S., Swan Hill, Jersey (4).										
Warwick Beauty 7th ..	C.R.	273	N.C.K.	5,715	4·93	281·9	270	Jr. 3	245 ..	Warwick Golden Lord
Warwick Fancy Madeira ..	Vol. 28	273	17	5,781	5·01	289·6	230	Jr. 2	.. ..	Leaven Brae A'do's Masterpiece
Warwick Princess 13th ..	Vol. 28	273	N.C.K.	5,823	5·25	305·5	230	Jr. 2	.. ..	Leven Brae A'do's Masterpiece
Warwick She'll Do ..	Vol. 28	273	N.C.K.	7,532	4·91	369·6	230	Jr. 2	.. ..	Leven Brae A'do's Masterpiece
Waterhouse, H. W., and Son, Pakenham, Jersey (4).										
Navuloa Grandmaster's Harebell	63358	273	22	7,766	5·52	428·8	290	Sr. 3	324 .	Werribee Grandmaster
Navuloa La Magnet ..	68275	273	20	6,396	6·40	409·3	290	Sr. 3	355 .	Staghorn Laburnum's Masterpiece
Ovalau Masterpiece's Cream	73320	273	21	7,219	6·05	436·4	270	Jr. 3	333 ..	Staghorn Laburnum's Masterpiece
Ovalau Wyandotte's Cream	Vol. 28	273	17	5,081	5·88	299·0	230	Jr. 2	.. ..	Brucevale Wyandotte's King
Watson, K. E., Gembrook, Jersey (1).										
Goronga Farm Jester's Pearl	53006	273	13	5,649	5·27	297·8	350	Mature	317, 345, 244, 302	Goronga Farm Jester
Whitehead, E. J., and Sons, Beaconsfield, Jersey (1).										
Selsey Champion's Lotus ..	69055	273	14	4,220	4·84	204·2	270	Jr. 3	229	Brampton Son of Champions (Imp.)
Williams, F. A. and L., Bamawm Extension, Jersey (1).										
Bamawn Bonnie Lass 3rd ..	Vol. 29	273	20	5,820	6·23	363·0	250	Sr. 2	.. .	Bamawn Peter Pan

Contents.

APRIL, 1942

		PAGE.
The Value of Farmyard Manure	*W. D. Andrew, M.Agr.Sc.*	161
Farmyard Manure and Soil Fertility	*A. C. T. Hewitt, M.Agr.Sc.*	164
Potato Production—Wartime Expansion		170
Pasture Improvement in Alkali Soils	*A. Morgan, B.Agr.Sc.*	171
Barley Prices		177
Live Stock Notes	*A. C. T. Hewitt, M.Agr.Sc.*	178
Wheat Variety Trials—Tests in Mallee, Mid-Northern, and East-Northern Districts		183
Victorian F.A.Q. Wheat—Analysis of 1942 Sample	*W. R. Jewell, M.Sc.*	188
Certified Pullorum-free Flocks		189
Excessive Leaf-fall of Citrus Trees		190
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	194
Garden Notes	*J. L. Provan, B.Agr.Sc.*	195
Green Manure Crops	*G. W. Gayford, B.Agr.Sc.*	197
Tubercle-free Herds		201
Pig Litter Records	*L. A. Downey, H.D.A.*	202
The Fungicides Act—Review of Registrations for 1942	*W. C. Robertson, Chemist*	204
Burnley Egg-laying Competition—Final Results, 1941-42	*H. F. Clinton*	206
Brucellosis-free Herds (Swine)		214
List of Licensed Skin Buyers		215

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

For Cooler Smoking . . . Finer Flavour

IN THE SMART GREEN & GOLD PACKS . . . .

also . . . FINE CUT and READY RUBBED

850-10 40

HAVELOCK
Flake Cut Tobacco

INDEX TO ADVERTISEMENTS

FRONT SECTION

Cooper Engineering Co. Pty. Ltd. ... opp. p. 171

Davis Gelatine Pty. Ltd. iv

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) ... ... opp. p. 170

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. v

Law Somner Pty. Ltd. (Seeds) vi

Leggo, Victor, & Farmers Ltd. ... inside cover

Lysaght Bros. & Co. Pty. Ltd. iv

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ii

BACK SECTION

Australian Cement Ltd. ... ... inside cover

Cockbill, J. vii

Commonwealth Serum Laboratories outside cover

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 206

Rylands Bros. (Aust.) Pty. Ltd. ... opp. p. 207

State Savings Bank vii

Trewhella Bros. Pty. Ltd. viii

Victoria Insurance Co. Ltd. ... opp. p. 207

Victorian Railways viii

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Journal of Agriculture, Victoria—April, 1942.

The Value of Farmyard Manure

By W. D. ANDREW, M.Agr.Sc., Assistant Agrostologist.

FARMYARD manure is a valuable commodity that should not be allowed to go to waste, especially in view of the present shortage of artificial manures.

As a fertilizer it is superior to the artificial products because it contains, in addition to the several mineral elements necessary for plant food, organic or vegetable matter that breaks down in the soil to form humus. This latter material serves the dual purpose of maintaining the soil in a good physical condition and providing food for the millions of micro-organisms essential for fertility in a soil.

Farmyard manure, therefore, is a complete manure, and as such has a special value.

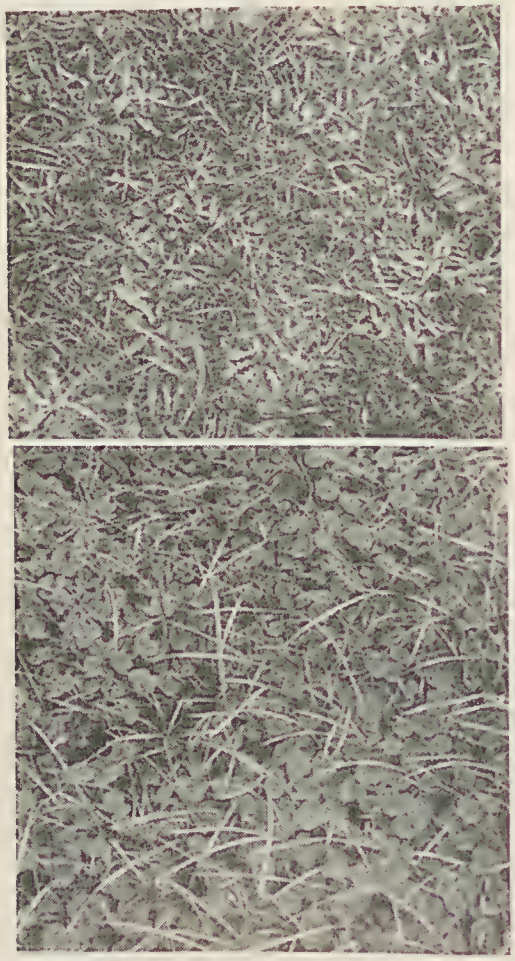
There is, however, another important reason why all farmyard manure should be used. A large part of the plant food in the herbage eaten by farm animals is voided in the dung and the urine, and the return of this excreta to the soil is most necessary if the fertility of the soil is not to be exploited. If the cycle is not completed, the soil is subjected to an exhaustive drain on the elements of plant food with the result that ultimately the available supply of one or more of these elements may become insufficient to meet the demands of the plants, and it will be necessary to use an appropriate artificial fertilizer to overcome the deficiency.

In many parts of this State, one of the first elements to become exhausted as a result of exploitation of soil fertility is potassium. This finding was first demonstrated on pasture plots conducted by the Department of Agriculture for the Victorian Pasture Improvement League. The technique employed on these plots involves the constant mowing and removal of pasture clippings, and under this treatment all of the soils in southern Victoria where mowing trials are conducted have become, to a greater or lesser degree, deficient in potassium. Some of the lighter soils became depleted after the first year of mowing, whereas the heavier types with larger reserves were able to withstand the treatment for longer periods, but nevertheless subsequently became short of this essential plant food.

Since this important discovery the signs of potassium deficiency have been recognized in many parts of southern Victoria, where the rainfall is relatively good, and no doubt there are many other places that have not yet come under notice.

A soil without available potassium may contain some reserves at present unavailable to the plants, and these become available slowly as time goes on, but this supply is inadequate for the needs of rapidly-growing plants. Claims that the addition of lime will release sufficient potassium under such circumstances have not been borne out in practice.

One of the first indications of a deficiency of potassium in the soil is the loss of vigour of the pasture plants and their failure to respond to superphosphate. Sometimes yellowing around the edges of the leaflets of clover



Top.—A pasture showing signs of potash deficiency. Lower.—The same pasture after being treated with potassic manure. Note stimulation of clover.

plants can be noticed. These signs are followed by the disappearance of the clover and better grasses from the sward and the intrusion of low-grade weedy species.

When a pasture gets into this condition it is necessary to apply some form of potassic fertilizer and sometimes to re-sow the area. Such a procedure entails considerable expense for seed and manure and loss in production. Prior to the war, potash salts were expensive, and at present, with these fertilizing materials practically unobtainable, farmers who have paddocks where the soil does not contain sufficient potassium are placed in a very awkward position.

Armed with the knowledge that such a deficiency can develop, it would be a calamity if, through carelessness, fertile country in this State were allowed to get into an unproductive condition.

Other elements besides potassium can be depleted by faulty management, and their replenishment may also be difficult and costly. In most places the soil is naturally short of phosphorus, and, ordinarily, superphosphate is used to complement the supply in the soil, but if there is a wastage of phosphate as a result of not returning farmyard manure it becomes necessary to use more superphosphate. This is undesirable at any time, but at present, with superphosphate scarce and rationing in operation, there should be no need to stress the need for not aggravating the position.

In this State few farm animals are bedded down on straw as in other parts of the world, and farmyard manure consists mainly of dung and urine. Solid excreta consists of undigested food or materials that have been used in the body and passed back into the intestine, e.g., phosphorus, while urine contains mostly soluble ingredients that are produced when the digested food is used, and these are much more simple chemically than the original foodstuff.

Generally speaking, animals retain only a small proportion of nitrogen from the food eaten, while the amount of mineral or ash voided in the excreta is almost equal to that ingested. Usually more than half of the

Manure dumped in a paddock and allowed to waste away.

nitrogen and nearly all of the potassium and sodium excreted by the animal is to be found in the urine, whereas most of the phosphorus and calcium voided is in the dung.

Of the two forms of excreta, weight for weight, the urine is the more valuable fertilizer, and, from the point of view of preventing potash deficiency, it is the more important. However, best results will follow if both the liquid and the solid matter are used together.

Most farmers do not make any provision for collecting the urine that runs away from the milking shed, while the dung is usually carted out and dumped on to a heap, where it is allowed to waste away. Unfortunately, farmyard manure is relatively unstable chemically, and a heavy wastage of fertilizing ingredients can occur within a short space of time. By suitable means it is possible to retard the decomposition of the farmyard manure to such an extent that there is not a large loss of organic matter; but for all practical purposes on the dairy farm, the main essential is to prevent the loss of the mineral matter in the excreta, as this is difficult to replace, whereas organic matter can be restored by growing leguminous plants, which build up fresh supplies from air and water.

An accumulation of dung in night paddocks.

Probably the most satisfactory method of conserving the mineral matter in farmyard manure is to allow the urine and washings from the milking shed to drain into an underground tank, and to collect and deposit the dung from the yards into a pit from which the drainage will also run into the tank. The distribution of the tank liquid can be carried out with a liquid manure spreader, of which several types are described in the accompanying article by Mr. A. C. T. Hewitt.

Apart from the disposal of the excreta at the milking shed, there is a problem in the accumulation of droppings in the night paddock adjacent to the homestead. Harrowing will distribute the dung more uniformly over the paddock, but does not alter the fact that fertility is being accumulated in one particular paddock at the expense of the more distant parts of the farm. Where possible, rotation of the night paddock over a wider area would solve the problem, while cultivation may be undertaken on the paddocks that have been heavily manured and the hay fed to the cows in the more distant paddocks. Naturally all this involves more work, but if it can be done it is work that will pay handsome dividends in the long run.

Farmyard Manure and Soil Fertility

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer.

BECAUSE of the increasing costs of artificial manures and the fact that many farms now require the more expensive potassic and nitrogenous fertilizers, some attention is being paid to farmyard manure.

The real value of farmyard manure is not yet fully appreciated in this country, and tremendous quantities are allowed to accumulate and waste around buildings and yards, where it cannot benefit crops and pastures. The urine, a very valuable liquid manure, is allowed, as a rule, to run to waste down a drain.

The manure and urine dropped on the pastures and crop paddocks are utilized, but it is frequently stated by farmers that it does not pay to collect and spread the manure dropped round buildings and yards. It is difficult to understand why farmers who appreciate the value of artificial fertilizers are not fully aware of the worth of farmyard manure, which is regarded by some as a liability rather than an asset, not worth the effort of removal from around farm buildings and other places where animals congregate on to land that would benefit greatly by its dispersion.

The Use of Minerals by Animals.

For their growth, development, and production animals require certain quantities of various materials, including minerals. A continuous flow of these materials through the animals is necessary for their bodily health. After use the greater part is excreted in the manure and urine. They are then passed back to the soil, re-used by plants, and again converted into animal food.

Usually, on farms where concentrates are purchased for stock feeding, much larger quantities of such essential elements as phosphorus, nitrogen, and potash are added to the soil than are removed from the farm in the meat, eggs, butter, wool, hides, or other products. Lime, on the other hand, is removed in larger quantities by animals than by plant products such as grain, but it is cheaply replaced by ground limestone, calcium carbonate, or slaked lime.

In countries such as England, where tremendous quantities of rich stock foods have been imported, especially since the 1914-18 war, the fertility of the soil has been greatly improved, and, now that crop farming has been reverted to, excellent yields may be expected for several years.

It is estimated that the dairy cow removes over 30 lb. of calcium phosphate from the soil in secreting 10,000 lb. of milk. Such a state of affairs does exist where the whole milk is sold, but, under the usual dairying procedure, where the cream is sold and the skim milk is fed to pigs, the total loss of calcium phosphate from the farm is only about 5 lb. for each 10,000 lb. of milk produced, provided, of course, that the farmyard manure is properly spread over the farm.

Two hundred pounds of bran or pollard and 6 lb. of ground limestone fed to the cows and pigs would make good that loss. If, on the other hand, the milk is sold, the amounts of lime and phosphoric acid leaving the farm in the whole milk can be replaced by hand-feeding 700 lb. of bran and 21 lb. of ground limestone. Seven hundred pounds of bran to a dairy cow producing 10,000 lb. of milk is very light feeding, since cows producing this amount of milk are frequently fed up to 3,000 lb. of concentrates. One-third of a bag, or 62½ lb., of superphosphate contains the same amount of phosphates as 10,000 lb. of milk.

On large pig and poultry farms an excellent opportunity exists for building up the fertility of the soil, and on small holdings where the amount of manure excreted is in excess of requirements, considerable revenue should be obtainable from the sale of manure to neighbouring farmers. When fed standard rations, a bacon pig consumes about 30 lb. of calcium

phosphates. After using much of this for the normal functions of the body, the pig excretes about 25 lb., mostly in the manure. Each laying hen eats about 4 lb. of calcium phosphate per year, of which about 95 per cent. is excreted in the droppings. Similar figures apply to nitrogen and potash, although most of the nitrogen and potash is excreted in the urine, and is more likely to leach away, especially from pig-sties, stables, and cow-sheds. Very few farmers yet realize the value of collecting this liquid manure.

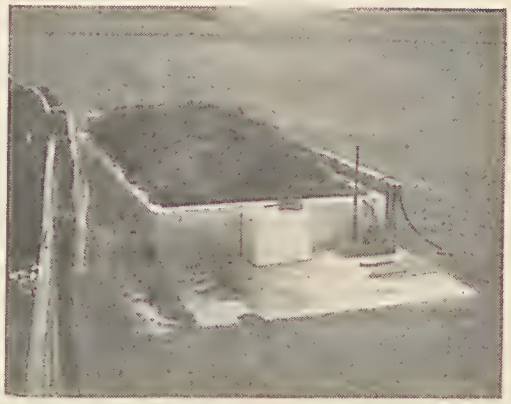
Commercial Value of Farmyard Manure.

It has been estimated that each year an average draught horse excretes 12 tons of manure, including urine. Based on present values of artificial fertilizers, this would be worth approximately 19s. 6d. per ton, or a total of £11 14s. A good dairy cow excretes annually 12 tons, worth £9 12s. at 16s. per ton; a bullock 7 tons, worth £6 16s. 6d. at 19s. 6d. per ton; a sheep 15 cwt., worth approximately £1 8s.; a bacon pig from birth to 200 lb. live weight excretes 1 ton, worth 14s., and a hen ½ cwt. per annum, worth 7½d. at 25s. per ton.

Residual Value of Fodders as Manure.

The residual manurial value of fodders eaten by animals is considered important in England and other European countries, where tenure of land is often arranged subject to the tenant feeding certain foodstuffs to the animals, and spreading the manure by orthodox methods. A tenant feeding large quantities of purchased foodstuffs may even be remunerated by the owner for increasing the fertility of the farm. In arriving at the residual value of fodders, the recommendations made in 1927 by the Committee on Residual Values of Fertilizers and Feeding Stuffs, England, are used. They lay down that two-fifths of the nitrogen and three quarters each of phosphoric acid and potash in the food shall be allowed to the manure. The following table is based on these figures. It shows that an amount of phosphoric acid, potash, and nitrogen equal to 12 lb. of superphosphate, 21 lb. of muriate of potash, and 40 lb. of sulphate of ammonia is allowed for in the manure from an animal consuming 1 ton of green, succulent, mixed pasture, and that these quantities of fertilizers would cost 9s. when superphosphate costs £6 11s. per ton, muriate of potash £20 and sulphate of ammonia £13.

A Furphy tank fitted with a "T" pipe for spreading liquid manure.



Compost pit on the property of Dr. Arnold Caddy.

RESIDUAL VALUES OF FODDERS AS MANURE IN TERMS OF COMMON FOODSTUFFS.

Fodder (1 ton).	Superphosphate. (22 per cent.)	Muriate of Potash.	Sulphate of Ammonia.	Approximate Total Value.
	lb.	lb.	lb.	£ s. d.
Mixed pasture, green, succulent	12	21	40	0 9 0
Pasture hay	33	54	51	0 17 6
Lucerne hay ..	39	58	108	1 5 0
Oaten hay	34	38	38	0 13 0
Oaten straw	14	50	16	0 11 0
Wheat	66	21	72	0 16 0
Oats	63	19	74	0 16 0
Barley	66	18	75	0 16 0
Maize	63	13	75	0 14 6
Bran (2,000 lb.) ..	192	45	94	1 9 0
Pollard (2,000 lb.) ..	177	42	97	1 10 0
Meat meal (2,000 lb.) ..	238	12	387	3 1 0
Linseed meal (2,000 lb.)	116	39	194	1 16 6
Separated milk (200 gal.)	14	6	24	0 5 0
Whey (200 gal.) ..	9	6	5	0 2 3

Collection and Distribution.

Dung and urine, when dropped in the pasture and crop paddocks, will be of value to plants, but that dropped around yards and buildings is largely wasted, as the valuable fertilizing ingredients are lost in the atmosphere and drainage. Furthermore, such manure leads to insanitary conditions by making dust in dry weather and mud in wet weather.

Many farmers have now made a definite attempt to handle the farmyard manure problem on sound practical bases, and, for the benefit of others who desire information on this subject, three methods, including those adopted by Dr. Arnold Caddy, "Chandpara," Tylden, and Mr. R. G. Caldecott, Tongala, are described below.

The sooner farmyard manure is worked into or spread over land, the better; otherwise many valuable fertilizing ingredients, particularly nitrogen, are lost. No advantages, except, perhaps, those of handling, are gained by allowing the manure to rot down. Once manure is gathered into a vehicle it should be carted and spread directly on the field, as the labour involved in dumping and re-loading is unwarranted.

Manure is most satisfactorily collected and stored in tanks or pits so that the soluble fertilizing ingredients do not leach away. The pits may be erected above or below ground level, but they should be so constructed that the liquid from the dairy, cowshed and yards gravitates into them. They should be as close to the sheds and yards as possible to avoid handling costs. Where the piggeries and stables are some distance away, separate pits should be constructed for the manure, urine, and drainage from each particular building. Liquid manure is easily pumped into portable tanks for distribution over the fields.

A Compost Pit.

A compost pit has been constructed by Dr. Caddy for the collection and storage of both liquid and solid manure from the cowshed and yards, pig-sties, and stables, as well as refuse and waste from the garden, haysheds, and farm generally. The liquid manure and washings pass through the solid material on their way to the sump and dissolve large quantities of the dung and straw. This liquid matter is pumped out of the sump at regular periods into a "Furphy" water-cart and drawn out into the fields, where it is sprayed over the pastures or crop paddocks.

The pit for solid manure and refuse holds about 30 cubic yards or 5,000 gallons, and requires cleaning out, when full, approximately once a year. If the material is stirred as the liquid passes through, it will require cleaning out less frequently.

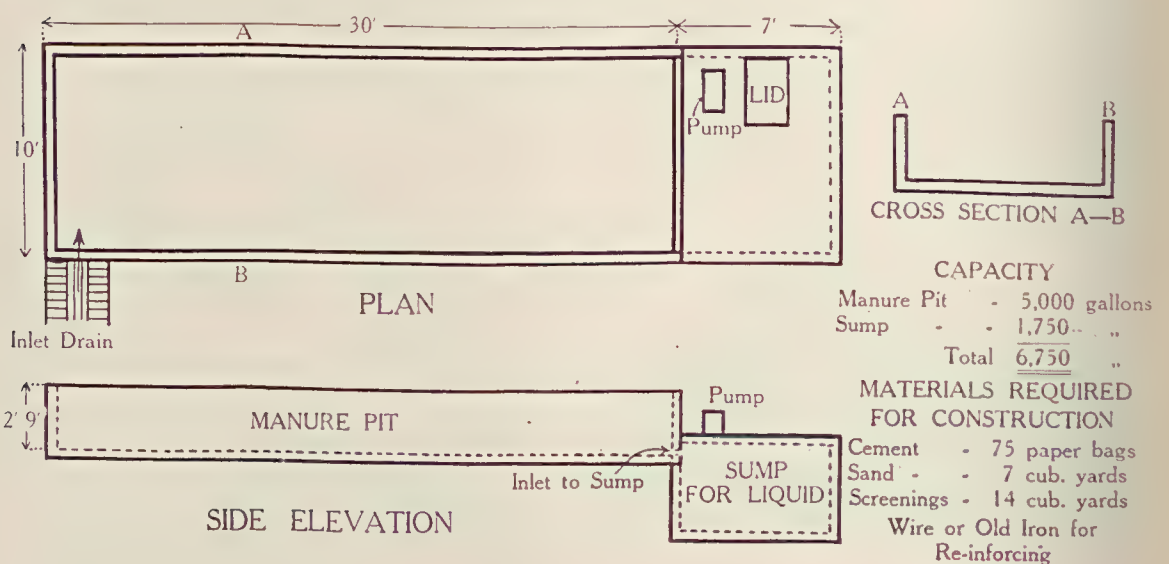


Fig. 1.—Plan and specifications of compost pit.

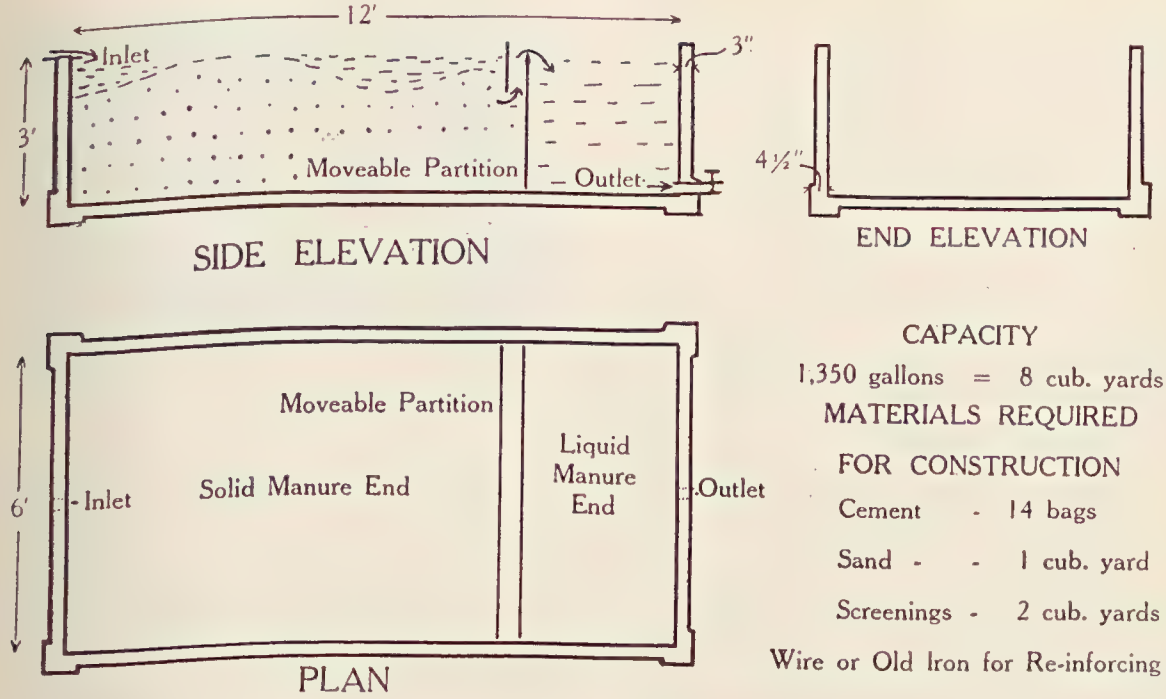


Fig. 2.—Plan and specifications of a simple compost pit.

The liquid manure sump holds about 10 cubic yards or 1,750 gallons, and requires emptying once a week or more frequently when large amounts of wash water or rain run into it.

It is estimated that, in the average cowshed, 2½ gallons of wash water is used for every cow milked, so that approximately 1,750 gallons of liquid would have to be handled each week where 100 cows are milked. In addition, there is rain water. For each inch of rain 500 gallons of rain water run off every 1,000 square feet of concrete cowyards and iron roofing. This would amount to an average of 500 gallons per week from a shed and yards covering 2,500 square feet, large enough to handle 100 cows, in a 20-in. rainfall district, or 1,000 gallons per week in a 40-in. rainfall area.

The compost pit (Fig. 1) is made from reinforced concrete, 6 inches thick, throughout. To make the pit, wooden moulds for the concrete are necessary. Old wire and scrap iron could be used for reinforcing. Four hundred cubic feet or 15 cubic yards of concrete, using a 5:2½:1 mixture of screenings, sand, and cement, is required, and to make this quantity of concrete 75 paper bags of cement, 7 cubic yards of sand, and 14 cubic yards of screenings are necessary. A paper bag contains 1 cubic foot of cement and weighs 94 lb.

The size and design of the pit can be varied to meet different circumstances. The liquid sump can be placed underneath or at the end of the solid manure section and, where the slope of the land permits, the liquid can be gravitated through a 2-in. or 3-in. pipe into the portable tank, thus dispensing with the pump.

With good concrete and suitable reinforcing, the walls and floor of the pit can be made 3 inches thick, but, in such cases, all the corners need to be made 4½ to 6 inches thick, similar to that shown in the diagrams of the simplified pit (Fig. 2).

A Simple Compost Pit.

Plans of a simple pit—12 feet long x 6 feet wide x 3 feet deep, with a capacity of 8 cubic yards or 1,350 gallons—are shown in Fig. 2. For making this pit, 14 bags of cement and 2½ to 3 cubic yards of river gravel, or 14 bags of cement, 1 cubic yard of sand, and 2 cubic yards of screenings, reinforced with wire and scrap iron, are required, and the pit is considered large enough where up to twenty

cows are milked. A moveable partition can be put in to hold the solid material at the inlet end of the pit and to allow the liquid to pass to the outlet end, as illustrated in Fig. 2.

The compost pits described above are suitable for use on farms where straw, horse manure, pig manure, and other solid matter are collected.

A Liquid Manure System.

Mr. R. G. Caldecott has devised a scheme for use in connexion with the cowshed where practically the only material handled is cow manure, urine, mud, and wash water. This scheme has proved most satisfactory, as practically all the material, except the coarser sand from the mud, is handled in liquid form and carted out into the fields once each week. All of the droppings and sweepings from the cowshed, yards, and dairy are washed into pits (see Fig. 3). When emptying the pits once each week, the manure is agitated so that nearly everything is dissolved or suspended in the liquid, which is then pumped into a portable tank and carted direct to the fields.

Liquid manure system on Mr. R. G. Caldecott's property.

With the sediment pit, main liquid pit, and portable tank, the capacity of the plant is 2,000 gallons, sufficient for a herd of at least 100 cows where 2½ gallons of water per cow are used for washing and cleaning daily, and where the system is emptied regularly once each week. Allowance for rain water has not been made, but, as explained previously, each inch of rain running off every 1,000 square feet of concrete yards and iron roofing will add approximately 500 gallons of liquid to the pits.

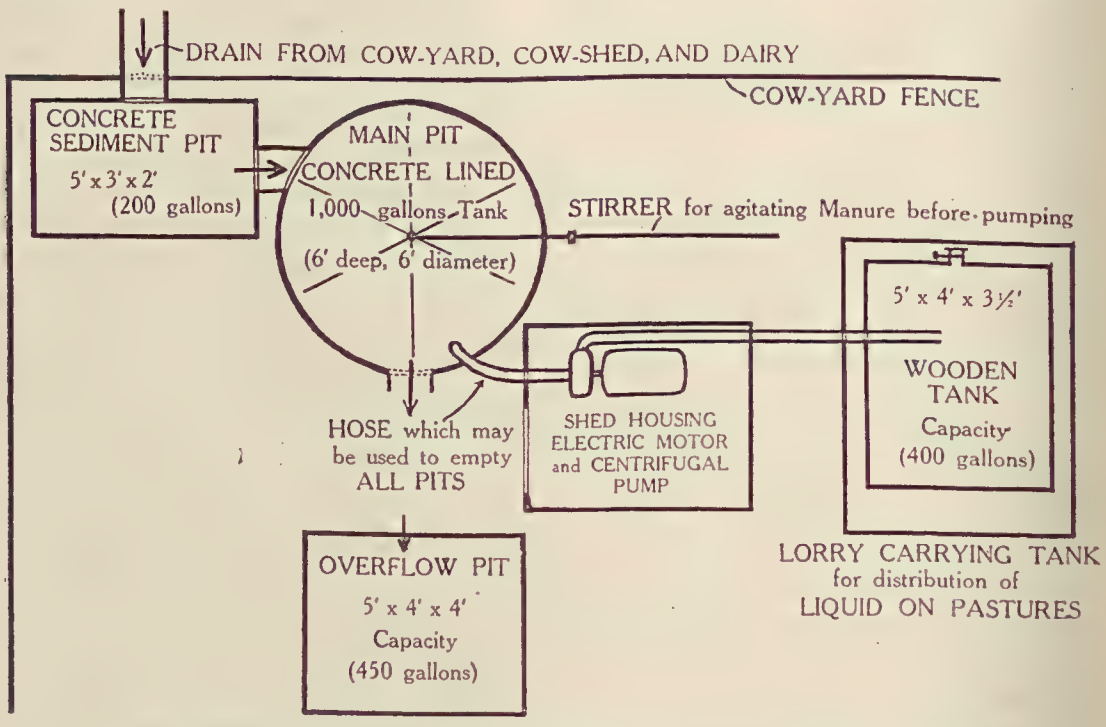


Fig. 3.—Plan and specifications of the liquid manure system illustrated above.

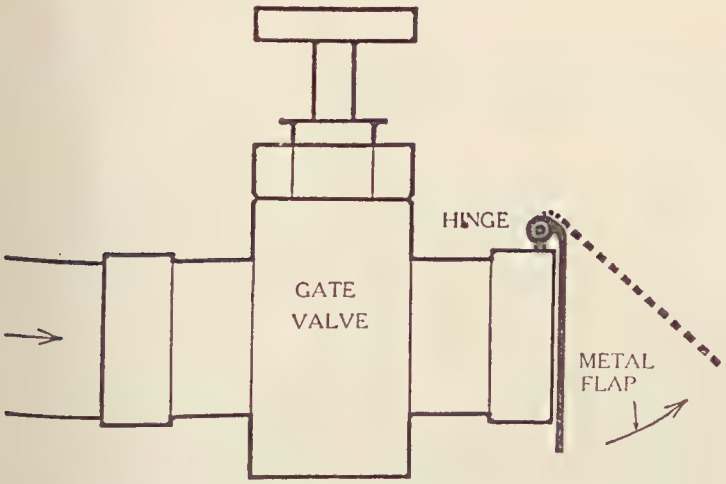


Fig. 4.—Gate valve showing flap which spreads liquid from portable tank.

To pump the liquid manure into the portable tank, a 1½-in. centrifugal pump is used, coupled directly with an electric motor. The main pit is a cement-lined 1,000-gallon tank, and two of these could be used—one as a sediment pit and one as a reservoir for liquid—to complete the system. The portable tank is a second-hand 400-gallon wooden brine tank placed on a lorry, and is easily drawn by two horses. The liquid is pumped from the pits to the pump through a reinforced rubber hose which can be moved to all the pits for emptying purposes. A stirrer is fitted into the main pit, and comprises an old cart-wheel resting on the bottom of the pit and connected to a lever. While the pump is working, the stirrer is simply lifted by means of the lever up and down through the sediment on the bottom, and in this way all but the coarsest sand is pumped out. At the end of each year Mr. Caldecott has to clean out about 2 feet of sand only from the bottom of this pit.

The liquid manure is emptied from the portable tank through a 2-in. pipe at the bottom. The flow is stopped or controlled by a gate valve. As the liquid gushes out, it lifts a hinged iron flap (Fig. 4), which normally hangs vertically over the end of the outlet pipe. This flap spreads the liquid fanlike, as shown in the illustration.

Other liquid manure systems are in use. Bilge pumps also satisfactorily lift the liquid manure and sludge into portable tanks. The liquid manure may be gravitated down channels to "irrigate" pasture and crop paddocks, thus dispensing with pumping and carting.

Daily Carting of Manure.

A method of handling farmyard manure, dispensing with manure pits, is to run the manure, urine, &c., directly into a portable tank and cart it on to the fields each day or, if the tank is large enough, each second day.

In such a system (see Fig. 5) the tank is backed under the end of the drain leading from the buildings and yards. For this purpose

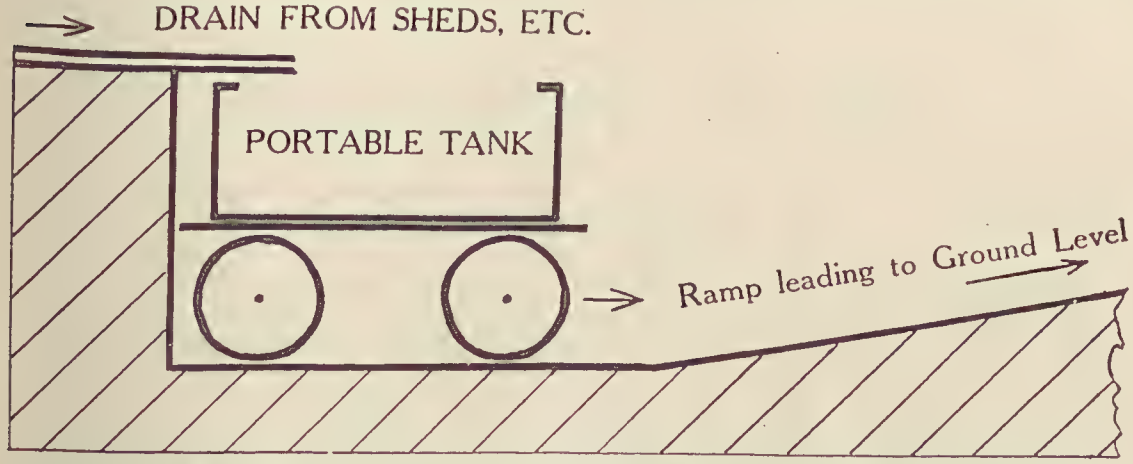


Fig. 5.—Showing portable tank in position for receiving liquid manure from cowyard, sheds, &c.

Liquid manure from portable tank being sprayed over the pasture.

a pit into which to back the tank will probably be necessary. On flat land the tank will have to be drawn up a ramp. The slope of the ramp and the size of the tank will have to be worked out according to the horse power available. Two horses will shift a fully-loaded 400-gallon tank with ease on flat and slightly undulating country, but, where the grade of the ramp is 1 in 6 or 1 in 8, a 200-gallon tank will be heavy enough. One horse can usually handle a 100-gallon "Furphy" water-cart on any part of the farm.

Whey Disposal.

It is usually impossible to feed all surplus whey to pigs, calves, poultry, or other stock during the flush of the year, and the best way to handle the surplus is to cart it out over the fields and use it as liquid manure. For this purpose a portable tank similar to that used by Mr. Caldecott is ideal. Whey and surplus wash water handled by this method will not cause any noxious odours unless the tank is stopped and too much run on to a small area, or unless the same ground is gone over too frequently. This method of handling surplus whey is one of the most satisfactory, as it is hygienic and returns valuable plant foods to the soil.

The 400 gallon portable tank used by Mr. Caldecott.

POTATO PRODUCTION

War-time Expansion

To feed the increasing number of troops in Australia and the civil population, a substantial increase in the production of potatoes is necessary. To secure the required acreage the Commonwealth Government has been advised that it will be necessary to take steps to ensure that growers receive a payable price for their potatoes. This preliminary announcement is made to enable potato growers to make arrangements in good time for extra seed and for the fallowing of additional land, preferably new land or land not used for potatoes or cereals last year. As soon as a definite plan has been decided upon the Minister of Agriculture will call a meeting of the Potato Growers Association.

Pasture Improvement in Alkali Soils

Results in Kerang District

By A. MORGAN, B.Agr.Sc., Irrigation Field Officer

An irregular crop of Millet. The bare patches are due to salt.

JUDGED solely on the reliability and adequacy of its irrigation water supply, the Kerang district would be regarded as eminently suitable for the growing of permanent irrigated crops such as subterranean clover, lucerne, and mixed pastures of perennial grasses and clover. However, the accumulation of alkali in the surface soil over a very large proportion of the district has been largely responsible for the slow progress in the change-over from annual to permanent crops.

The causes of deterioration of the land, particularly in the area bounded by the Loddon River, Pyramid Creek, and the Macorna Channel, have been fully discussed in Bulletin No. 125—"A Soil Survey of Part of the Kerang Irrigation District"—issued in 1939 by the Council for Scientific and Industrial Research. The evidence presented in this bulletin need not be reiterated; it is sufficient to state that over-watering, over-grazing, seepage, lack of manuring, floods, and droughts have all contributed their share in the accumulation of harmful minerals (of which salt has proved to be the most important) in destructive quantity in the surface soil.

Damage due to these minerals is not confined to any particular soil-type, although in general the "red plain" and "grey plain" are not as badly affected as the "box" land, but exceptions are not difficult to find, and there is lightly- and heavily-affected land in all the soil-types.

If salt had not developed in the district, the problem of establishing and maintaining pastures of high productivity would not be a difficult one, providing the land is in a fit condition for efficient irrigation and drainage. Such a condition is attained only by good grading and lay-out. The principles governing

the preparation of land for efficient irrigation have been repeatedly set out in articles in this *Journal,* and it is not proposed to refer to them except in so far as they have a special bearing on the problems peculiar to the Kerang and Cohuna districts. Grading and lay-out are essential to permanent control of waterlogging, and doubly necessary where the ground-water is very close to the surface and highly charged with salt.

Drainage is essential. Main drains have been excavated through the district as quickly as possible, and it is vital for the irrigator to make private connexions to these wherever possible. The elimination of all excess surface water, whether derived from rainfall or irrigation, helps materially in keeping the ground-water at a safe distance from the surface. Drainage by itself, however, is definitely limited in its effectiveness in reclamation, and the available evidence from bores, &c., shows that the drains have not been able to reduce the ground-water to the extent originally hoped for. It must be supplemented by other activities, of which pasture improvement is the most important.

Reverting to the question of soil-types in the district, it will be obvious that certain differences in natural fertility, penetration of irrigation water, &c., will have considerable bearing on the selection of the most profitable permanent crops. Assuming salt to be absent or eliminated, the natural fertility and the permeability to irrigation water increases from red plain, to grey plain, to box land. Certain minor soil-types along the Pyramid Creek take water readily when free of salt, and one sub-type of box land—locally referred to as "loose-top"—is particularly suitable for all types of permanent irrigated crops and will grow permanent mixed pastures, which are second to none in productivity. This has been proved by experiments on the property of Mr. T. Bott, of Dingwall, since autumn, 1939.

Red plain land occupies over one-third of the total area in the site chosen for the C.S.I.R. soil survey, and because of its relatively low natural fertility and its low absorption of irrigation water it is the most difficult to improve to a stage where it will grow profitable crops of lucerne and mixed perennial pastures. In this case the use of subterranean clover, which can be kept up to a high standard of production by regular top-dressing with superphosphate after the salt has been leached out, should be the main avenue of improvement. This soil, on the average, takes about 2½ inches of water at a watering, assuming grading and lay-out to be good and the salt content reduced to a point where pasture species can be grown.

In the hot summer months very frequent irrigation is necessary to maintain permanent pastures on red plain land, and it is only with very good lay-out, heavy top-dressing with superphosphate, and great care in grazing, that a good sole of pasture can be built up and maintained. Only small areas, properly fenced, can be looked after satisfactorily, and taking the factors of labour, subdivision, and water-cost of the feed into account, it is preferable to concentrate largely on pastures of Wimmera rye grass and subterranean clover. For summer feed for relatively large paddocks the choice lies between the summer fodders such as millet, ambercane, saccaline, and Sudan grass, and the permanent crop of lucerne. Up to date, on this soil type, the amount of lucerne planted has been negligible. On slightly better soil, free from salt, at Macorna and elsewhere, some success has been achieved with lucerne as a grazing proposition, and it is considered that it will pay much better than millet when taken over a period of years, but any outstanding successes with lucerne in the district have been obtained on soils of higher natural fertility and better permeability. It is unusual to find a property without some of the better types of soil within its boundaries, and if the salt is not too bad, or can be removed, patches of lucerne can be grown with profit on selected areas covering the better-class soils.

Grey plain is quite good enough for lucerne once the salt has been dealt with, and experiments at the plots on the property of the late J. K. McIntosh, Tragowel, have shown that all the well-known grasses and clovers (including *Phlaris tuberosa,* perennial rye grass, Wimmera rye grass, paspalum dilatatum, Rhodes grass, cocksfoot, Kikuyu, white clover, strawberry clover, alsike, red clover, and subterranean clover) do well under reasonable management of irrigation, manuring, and grazing. For the first few years it is to be expected that the effects of severe grading on crab-holey land will show up in patchy growth in some areas.

While the salt remains concentrated in the surface soil, however, the trial of superior species is likely to be attended by disappointment and financial loss, and with the object of

investigating the most reliable methods of eliminating the salt and of applying the lessons learned from pasture improvement work elsewhere a series of plots was financed by the Victorian Pasture Improvement League in 1939. The establishment and maintenance of the plots has been under the supervision of the Department of Agriculture.

On each major soil-type a block of at least 10 acres was selected in the Kerang district, and, later, a similar block was chosen in the Cohuna district, the soil in the latter case being heavy dark clay. The blocks chosen were regarded as suffering from the disabilities of salt, crab-holes, rabbits, Dillon bush, and weeds to rather more than the average of the district for each soil-type. During the first year (1939) the work of soil-sampling, putting down bores, fencing, clearing Dillon bush, grading, channelling, and drainage was pushed forward as rapidly as possible, but was hampered by early autumn rain, and had to be completed in the summer of 1939-40. Space does not permit the publication in full of the details of this work. Soil-sampling, which was carried out under supervision of Mr. F. Penman, M.Sc., of the State Laboratories, provided a detailed survey of the salt content of the soil and of the groundwater on each block, and the following table shows some of the results from the block at Mr. A. C. Kerr's, Kerang East (red plain soil), in March, 1939.

The remaining three blocks were selected at the late Mr. J. K. McIntosh's, Tragowel (Grey plain = Kerang clay), Mr. D. J. Smith's, Koroop (Tragowel clay = Box land), and Mr. T. E. E. Bond's, McMillans (soil not classified).

Table 1.—Survey (in Part) of Salt Content of Soil and Ground-Water, and Depth of Free-Water Table, at Plots on Property of Mr. A. C. Kerr, Kerang East. Soil-Type: Macorna Clay. March, 1939.

Bore Number.	Percentage of Salt in Soil at Depth of—		Percentage of Salt in Ground-water.	Depth of Free-water Table (in Inches).
	0–6 in.	6–12 in.		
1 ..	·30	·79	1·31	41
4 ..	·03	·13	2·51	31
7 ..	·21	·14	3·45	32
10 ..	·08	·15	3·01	28
13 ..	·76	·81	·71	26
15 ..	·82	1·18	4·44	36
18 ..	·66	1·23	4·43	34
21 ..	1·41	1·34	4·29	31
24 ..	1·94	1·42	4·00	30

Kerang East.

Mr. Kerr's block was the first to be selected, and grading was commenced in the autumn of 1939. Heavy rain fell in February, and later conditions were too wet for satisfactory grading. This was aggravated by the fact that salty land becomes more sticky, and dries out more slowly, than normal land, and the nearer the free-water is to the surface the greater the difficulties experienced. As the land was partially graded, and worked up to a state suitable for sowing, however, it was decided to make experimental sowings of cereals and pasture species as a guide to future operations. No irrigation was practicable, and patchy germination and growth of all species sown was obtained. This was fed off in the spring, and grading was resumed, with the result that the block was put into fair order for annual cropping and irrigation. Some sections were given special attention and sown in autumn, 1940, with Wimmera rye-subterranean clover, lucerne, and permanent mixed pasture, and portion set out as a watering and manurial trial. These sowings gave good establishments, which have persisted and improved. The annual crops (oats, barley) were patchy. A large number of germination counts, yield-samplings, and soil-samplings was done. This investigation was helpful in tabulating salt-tolerence of various species and planning future sowings.

Incrustation of salt at Mr. A. C. Kerr's plot, Kerang East.

Wimmera rye grass and subterranean clover bay at Mr. A. C. Kerr's plot.

In the spring of 1940 further grading was done on sections to be sown with millet, and the following autumn the area was re-graded and sown (in April) with permanent crops. As the season remained dry, and no germination was expected, irrigation in late autumn was resorted to. The results were disappointing, except on the bays which had previously been under millet (i.e., summer watered), and showed that seepage between bays was an important factor—so important that differential watering and sowing treatments on this block and others have had to be abandoned. Last spring (1941), the area was sown with millet, without any great disturbance of the cover of weeds, barley grass, &c., and is being frequently and regularly watered *en bloc*. Sowings of pasture this autumn are expected to be fairly successful as a result of this treatment. The pastures and lucerne sown in 1940 have improved progressively, but are still below the productivity which would be possible on land free from alkali.

Tragowel.

The grey plain site at Tragowel is situated in a large area of Dillon bush country infested with rabbits, and it was only by wire netting the block that any results could be achieved. Although this plot was shown by the soil and ground-water survey to be in the same condition as Kerr's in regard to salt-content, the free-water table was lower (48 to 60 inches), and no difficulty has been experienced, in spite of adverse seasons in regard to rainfall, in establishing pastures and lucerne. Some seepage effects due to preliminary sowings of annual crops are observable, but at the present time 5 acres of the plot is under lucerne and permanent pasture, and such grasses as Rhodes grass. *Paspalum dilatatum*, and *Phalaris tuberosa* have been established without difficulty, except where scouring occurred, caused by autumn irrigations. The remaining 5 acres is scheduled to be re-graded and sown with permanent crops this autumn, but difficulty is being encountered because of shortage of labour.

Although this plot has been satisfactory, it would be incorrect to assume that all grey plain land in this vicinity can be improved so easily, as the ground-water conditions are worse in some areas, and results similar to those obtained at Kerr's would be expected.

Koroop.

The Koroop plot is situated in a bend of the Pyramid Creek, and irrigation supplies are obtained by pumping from the creek. The water travels some distance before reaching the plot, but difficulties associated with control of the water were overcome through the assistance freely given by the State Rivers and Water Supply Commission. Necessary structures,

Lucerne bay at Mr. A. C. Kerr's plot.

and a wheel-meter, were installed under the supervision of Mr. H. C. Kermode, until recently Engineer for the Cohuna district.

Mr. A. C. Kerr's plots, Kerang East; permanent pasture bay.

Watering trials were intended to be the main investigation on the plot, together with manurial tests, as it was considered to be too badly salt-affected to be suitable for sowing trials. The grading was done by Mr. D. J. Smith, and the trials commenced in autumn, 1940. Oats and barley were sown, and winter rainfall was relied upon to strike the seed. The season remained dry, and the seed was "pickled" before irrigation began in August. Continued for a season, the watering trials showed that best results were obtained where (*a*) frequent *regular* watering, and (*b*) ponding, were practised. Plots where these features were combined were outstanding, and sowings of Wimmera rye grass, trefoil (*Medicago hispida* Gaertn.), and cluster clover (*T. glomeratum*) in autumn, 1941, gave almost complete coverage. Seepage effects due to differential watering were noticeable, however, and it became necessary to water the area *en bloc*. No results have been obtained from differential manuring as yet, except for colour responses due to nitrogenous manures. The subject of top-dressing salt-affected ground is discussed later.

While it is possible that some success will attend a sowing of Wimmera rye grass on this plot this autumn, plants less tolerant to salt are not considered worth trying. Present efforts are directed towards establishing and maintaining a cover of weeds and volunteer species of grasses, and to establish the rye grass in these with a minimum disturbance of that cover.

Subsidiary investigations have been made in regard to seepage from the Pyramid Creek and the effectiveness of surface drainage. Regular and frequent readings of over 30 bores, carried on for more than two years did not give any evidence of seepage from the creek, as no significant changes in the water-table occurred at times when the creek was emptied or filled. However, it is possible that in certain areas very different results might be obtained. There was ample evidence of seepage from the channel put in to serve the experimental area.

A main drain skirts the plot, and it was expected that a progressive lowering of the water-table would result, This has not occurred, and at a distance of less than half a chain from the drain the water-table is nearly 3 feet higher than the bed of the drain. It is obvious that surface drains, while indispensable, are limited in their effects, or at least very slow in their action. Identical results have been obtained at the other blocks.

McMillans.

The McMillans block is the worst-affected in the series. This is particularly evident from consideration of its permeability to water. No matter what method of watering has been used (e.g., slow *v.* fast, first *v.* later waterings, ponding, &c.) the ground has never absorbed more than 1 inch at a watering, whereas normal soil of this type is expected to take 3 to 4 inches, according to its slope. The water-table is very high, and the frequent watering required to maintain pastures of rye grass, paspalum, and white clover in adjoining paddocks ensures that this high water-table will be maintained. Two seasons' grading (1940 and 1941) was required to put the area into good order for irrigation, and on each occasion great difficulty was experienced in breaking down the soil into a condition where it would run easily under the grading board. This loss of physical condition has been commented on by F. M. Read ("Soil Alkali Investigations at Tresco," Jour. Dep. Agr.

Vic., XXVIII., 2 Feb., 1930, p. 68). It was impossible to work it in a moist condition owing to its sticky character.

Watering and sowing trials were carried on in those seasons, but, as on the Koroop and Kerang East blocks, seepage effects have necessitated abandonment of differential watering. The block is now being watered frequently and regularly as a whole, and with encouraging results. A good cover of seablite and similar weeds has been established over the greater part of the block, and also patches of Wimmera rye grass. Recently, several large patches of strawberry clover (a local strain) have been noted in a thriving condition. Surface sowing of Wimmera rye grass, without disturbing the present cover, and top-dressing with superphosphate, is the programme contemplated next autumn, while the present system of watering will be continued.

Lay-out and Irrigation of Salt-affected Land.

While the border-check system of lay-out for irrigation has given some result on the Koroop and McMillans blocks, it has not proved as quick or as effective as ponding. On the other hand, when reclamation has been effected, ponding proves to be inconvenient and wasteful of irrigation supplies. These considerations suggest that a border-check system with small cross-checks (which can be wiped out easily when no longer required) will greatly reduce the time and labour necessary to reclaim badly-affected land of these soil types. If the land has very little fall, no cross-checks are required, as ponding can be effected by closing the drainage outlets for a given period. The injurious effects of watering one area of land, and leaving an adjoining area unwatered, are increased by ponding as compared to the normal border-check system, and the irrigator therefore is forced to choose the lesser of the two evils.

The labour involved in watering badly-affected land is a matter of some importance, particularly when it is realized that it has no earning power for three years or more. There also are other factors, peculiar to this land, which limit the efficiency of the water used, particularly in the season following the grading. Grading destroys the cover, and unless seed sown is brought up by rain within a short time it is likely to be "pickled" by the salt. Irrigation removes this danger, but if the land has any appreciable fall, scouring is likely to occur. These scours do not heal over with vegetation as on normal land, but tend to become worse, and it is difficult to block them with salty soil, as it washes away very easily. Similar difficulties are often experienced with channels, outlets, &c. Where no cover develops, the water passes over the surface without satisfactory penetration, and the process of leaching out the mineral is thus prolonged. Poor production from this land does not encourage the frequent and regular watering necessary for success. Sporadic watering in summer time cannot be recommended. If frequent and regular watering is not possible it is better to limit the use of water to the period February to November.

Showing effects of seepage on Mr. A. C. Kerr's plots. Bay A—watered during summer, 1940-41; bay B—not irrigated. When sown in April, 1941, bay B failed.

Top-dressing of badly-affected land is not of much assistance. As pointed out in Bulletin No. 125, referred to previously, there is no plant population capable of responding to the phosphate and giving some return for the outlay. A light dressing of "super." does produce results, however, when watering has induced the return of some annual legumes, and increasing amounts of superphosphate can be applied as the improvement becomes more and more evident.

Normal methods of fallowing and cleaning up weeds before sowing are not efficient on

badly-affected land, where it is desirable to retain all possible vegetation to shade the ground and to draw off excess soil moisture. Any seed sown should be surface sown and covered with as little disturbance of the soil as possible. Because of their ability to strike on the surface, Wimmera rye grass, and, later on, subterranean clover, are especially valuable.

Although conditions for pasture improvement are difficult on certain areas on the different soil types, it is necessary to point out that a large part of the district is quite suitable for the growth of permanent crops. Each year further improvement in lay-out, in types of crops grown, and in manurial treatment is evident. Grazing management lags behind these, and to some extent finance for subdivision is responsible. In general, however, there is not a good appreciation of the importance of regular recuperative periods to pastures. Subterranean clover paddocks in particular are subjected to almost continuous grazing.

BARLEY PRICES

Small Lots now available from Board

FOLLOWING representations made by the Minister of Agriculture, Mr. Hogan, the Australian Barley Board has decided to make available to buyers, whether consumers or distributors, 50-bag lots of barley at the same prices per bushel as those published for truck load quantities.

Feed barley may now be purchased direct from the Australian Barley Board, 483 Collins-street, Melbourne, in 50-bag or full rail truck lots at the following prices on trucks at country railway stations where barley is held by the Board:—

	s.	d.	
Feed Cape ..	2	5	per bushel.
Feed English ..	2	7	per bushel.
Cape No. 3 ..	2	6	per bushel.
English No. 3 ..	2	8	per bushel.

Smaller quantities down to bag lots will be made available at an increase of 2d. per bushel on the foregoing prices.

As practically all the feed and No. 3 barleys held by the Board in Victoria are at Wimmera stations, most consumers will have to pay from 3d. to 6d. per bushel freight in addition to the purchase price. However, it will still be possible to land barley on the pig, dairy, or poultry farm and grind it for a total cost of about 3s. per bushel. Prices at present ruling for pigs, milk, and eggs are sufficiently high to enable producers to feed barley at the prices quoted above.

Whereas few farmers have the capital to purchase or the room to store a 16-ton truck load of barley which comprises 230 bags of English or 235 bags of Cape, nearly every pig, poultry, and dairy farmer should be able to purchase and handle 50 bags at a time.

Live Stock Notes

Compiled by A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

Weeping Willows.

THE Weeping Willow (*Salix babylonica*) has many uses, which make it a valuable asset on many pastoral and dairy farms. It can be used to prevent soil erosion and to fill up gullies; to provide shade for stock in summer time, and to supply an excellent green feed for dairy cows, poultry, and other stock in the dry summer months, with its foliage and green twigs. The wood makes a good but quick-burning fuel, while from a pictorial standpoint the willow adds beauty to the farm and landscape.

Weeping willows are most useful in undulating country with an annual rainfall of 25 inches or more, although they do well in lower rainfall areas if they are able to get moisture from channels, drains, dams, or other sources. They must have ample water and do best when planted in the winter in gullies where seepage or drainage water is available. Boughs about 9 feet long and 3 inches in diameter are usually planted, and, with sufficient moisture, they grow rapidly. If thin boughs are planted rabbits may ring bark them, and, if too short, the farm animals will prevent them from growing by eating off the shoots.

As soon as willows become established they check the flow of water down gullies, which gradually fill up. On very flat country willows may block the flow of water too much and cause undue flooding. In such cases they may become a nuisance rather than an asset.

Willows provide dense shade and shelter from the summer sun and hot winds, but, being deciduous and therefore bare of leaves in the winter, they are of little value for protecting stock against the cold winter winds.

One of the greatest values of the weeping willow is that it provides an excellent reserve of green feed for stock in the summer when pastures are dry and other green feed is scarce. Stock relish willows and eat every leaf and fine branch that hangs within reach. As a greenstuff for dairy cows, poultry, and other stock, the leaves and twigs have proved very satisfactory. During droughts many willows are lopped for the stock, but, unfortunately, too few are grown for this purpose.

Willow trees stand frequent and severe lopping, although it is wise not to touch the trees during good seasons.

A typical weeping willow providing shade. Note how stock have eaten the lower foliage.

	Weeping Willows.		Mixed Pasture.	
	Leaves Only.	Leaves and Twigs.	Succulent.	Flowering.
Chemical analyses.				
	%	%	%	%
Moisture ..	68·0	68·0	80·0	75·0
Ash	3·0	2·4	2·3	2·1
Crude protein ..	7·5	5·2	5·6	3·7
Crude fat ..	0·9	0·7	1·1	0·9
Crude fibre ..	3·8	8·2	3·2	7·1
Carbohydrate ..	16·8	15·5	7·8	11·2
Food values.				
Starch equivalent	18·0	18·0	14·0	14·0
Protein „ ..	5·1	3·4	4·5	2·2

The chemical analyses and food values of weeping willow leaves, and leaves and green twigs up to ¼ inch in diameter are shown above. For comparison, corresponding figures are shown for mixed grasses and clover pasture in both the succulent and flowering stages.

The chemical analyses and food values of willow leaves and pasture compare very favorably. Higher food values are shown for willows, but this is principally because they contain less water or moisture.

When rationing it is difficult to say what quantity to feed, because the branches are usually lopped and the stock allowed to eat as much of the leaves and green twigs as they desire. It is estimated, however, that up to 20 lb. per day can be fed with pasture hay to each dairy cow with good results.

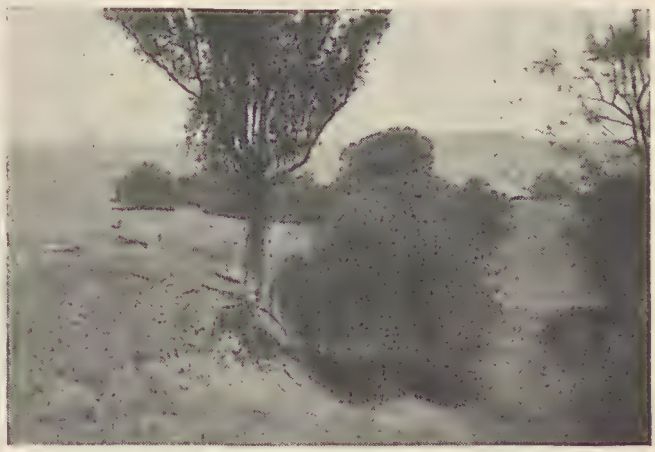
The quantity to lop daily would have to be worked out in accord with the number of trees available, the number of stock, and the period over which they are to be fed.

Experiments in South Africa have shown that the green weeping willow leaves and fine twigs, as a green food for poultry, are equal to lucerne.

Other varieties of willow are the basket, bat, and the pussy willow. Many of these willows have specific advantages, but they do not combine all the desirable qualities of the weeping willow. Some varieties, such as the pussy willow, can be grown under drier conditions and used to check erosion in gullies, where it is too dry for the weeping willow, but they grow erect and do not provide the same quantity of edible fodder.

Dairy Cows.

The importance of a good water supply is seldom realized until the existing supply fails and water carting or the travelling of cows and other stock to water becomes necessary, as happened on many farms this year. When milking cows have to travel long distances or have their drinking water restricted in any way, they drop rapidly in their yields, with the result that the farmer has less milk and more work. The work involved in carting water or taking a herd to a distant supply, occupying several hours a day until such time as good rains fall, is



Willows assist in controlling erosion in gullies.

excessive in comparison with the building or cleaning out of a permanent dam. Every possible effort should now be made to clean out dams and waterholes before they are refilled, so that they will hold plenty of water for the next few years. In a district with a 30-inch rainfall, provision should be made for storing sufficient water for at least 6 months, whereas in a district with a 20-inch rainfall, a 12 months' supply should be stored.

Topdressing should be completed this month so that the pastures will respond fully to any early rains before the cold weather sets in.

Sheep.

Although the Sheep Show has been abandoned, there is no reason why rams, selected as possible show and stud sale animals, should be turned out. It is expected that special sales, run in conjunction with some form of show or competitive entry, will be held, and some preparation of the sheep for these fairs is necessary, even though they may not be got into full show bloom and condition.

As metal ear tags may be hard to procure this season, breeders of stud sheep are advised to consider alternate methods of marking, such as ear-marking or tattooing. When properly done tattooing is most satisfactory, but the operator is advised to make sure that he has the correct numerals in the pliers before he cuts the stencil in the ear, and that the ink is well rubbed in.

[N. A. Bowman, Sheep and Wool Expert.

Lime Necessary For Grain-fed Sheep.

Investigations carried out by the Division of Animal Health and Nutrition of the Council for Scientific and Industrial Research have shown that where cereal grains and their by-products form the bulk of the ration, as is customary for supplementary and drought feeding of sheep, the health of the sheep may be seriously affected. This can be entirely prevented by the addition of one per cent. of finely ground calcium carbonate (limestone) to such rations.

After being fed for 27 months on a ration consisting of 44 per cent. wheaten chaff, 25 per cent. bran, 25 per cent. oats, 5 per cent. linseed, and 1 per cent. common salt, ten out of twelve ewes and all of the six weaners died. Where similar sheep were fed on the same ration supplemented with one per cent. of finely ground limestone, all of the ewes and five of the six weaners lived. All of the animals were allowed to feed to capacity on the rations.

Changes in Live Weight.

The live weight of the weaners receiving one per cent. of ground limestone in their rations increased by 110 lb. per head, whereas those not receiving lime increased slightly at the start, but then gradually fell away in weight, condition, and health until they died. When the last weaner died it weighed 35 lb., one pound heavier than when weaned two years earlier.

Results with the ewes were almost as striking. During a period of 10 months in the first year the average loss in live weight of the ewes on the deficient ration was 7 lb. each, whereas each ewe receiving lime gained 40 lb. in live weight.

Development of the Teeth.

The teeth of the weaners receiving one per cent. of ground limestone developed normally in every way, but the teeth of those not receiving lime did not develop. In some the milk teeth persisted until death, which in one case was 27 months after the experiment started, while striking malformation of the teeth and gums was shown by the others. Even weaners which were on a lime-deficient ration for the first nine months of their lives and then given a supplement of calcium carbonate failed to show normal dental development.

Composition of the Blood.

Striking differences in the chemical composition of the blood were noticed between the sheep on the two diets. Those on the low calcium diet developed low values for blood calcium, with correlated changes in magnesium and phosphate values.

Wool Production.

There was a marked increase in the amount of wool produced by the sheep receiving the supplement of ground limestone above the sheep on the deficient rations.

General.

Later experiments have confirmed these results, and have emphasised that the use of cereal grains or by-products in rations for sheep feeding, unless supplemented with calcium carbonate, may result in decreased food consumption, loss of weight, poor wool growth, faulty dental development, a disordered mineral metabolism which is reflected in the mineral composition of the blood, and a heavy death rate if the feeding is carried on over a lengthy period.

Cereal Grains Should Still be Used.

The results obtained in these experiments should not discourage the use of cereal grains in sheep feeding. But they do emphasize the importance of adding additional lime to the ration of sheep which are relying mainly on grains or their by-products. This applies not only to sheep being fed under drought conditions but also to stud sheep, which are often given a generous allowance of cereal grains.

A reasonable supplement of clover or lucerne as hay or silage should correct the deficiency of lime in the cereal grains, as both are rich in this mineral. If these hays are not available, the harmful effects can be prevented entirely by the addition of one per cent. of finely ground limestone to the cereal mixture. When this method cannot be adopted, for example when whole grain is fed in troughs or "trailed", a lime lick can readily be prepared by the grazier, by mixing salt and finely ground limestone in approximately equal proportions. If necessary, satisfactory consumption of such a lick can be encouraged by the addition of a small quantity of molasses.

Finally, it is interesting to speculate whether the same disturbance of mineral metabolism as described may be operating to a lesser extent when hand-fed sheep for no obvious reason fail "to do well". If so the remedy is obvious and is easily and cheaply applied.

Pigs.

Look After the Boar.

The useful life of a boar in the breeding herd and the number of his progeny are influenced by the treatment he receives. Too frequently the boar is considered by pig raisers as requiring only the roughest of treatment, and he does not always get a chance to produce to the limit of his capacity.

It is suggested that boars should first be put to service when they are about eight months old, but a young boar should not be allowed to run continuously with a herd of sows. He should be kept in his own run, and sows should be taken to him for one service and then removed. It is advisable to return a sow for another service on the second day of her heat period. This treatment is also suggested for a mature boar which is used in a large herd of sows.

Service dates should be recorded, and sample cards for this purpose are available free of charge from the Department of Agriculture, Melbourne.

Boars should always be well fed to keep them in good condition—neither very thin nor very fat—and their diet should contain either separated milk or meatmeal and grazing or a daily allowance of green food or green lucerne hay or chaff. These foods are very necessary to maintain the fertility of the boar.

[L. A. Downey, H.D.A., Pig Expert.

Poultry.

The pullets should now be comfortably housed in their new laying quarters. They must receive good attention, as proper treatment in the early laying stages will develop and maintain the stamina required for high egg production and disease resistance. This is important because the cost of replacing birds is high, and the longer they are kept in good health and production, which should be until the end of the second, and sometimes the third laying season, the more profitable poultry farming will be.

In the laying houses pullets should be graded for size. Over-crowding must be avoided by providing not less than four square feet of floor space per bird. Much depends on keeping the birds supplied with clean straw litter, which should be replaced with fresh material every three months. This reduces the risk of introducing worm eggs and disease germs to the birds.

Red mites, which live in the cracks and crevices of the perches, must be kept in check by applying at regular intervals a good disinfectant at full strength.

The birds must receive a variety of good, clean food, together with a continuous supply of tender greenstuff, shell grit, and fresh drinking water.

Generally, the essentials for success are correct feeding and a clean, dry and comfortable environment.

[H. F. Clinton, Poultry Expert.

Bees.

The removal of surplus honey from the hives should be completed by the end of April, care being taken to leave each colony with sufficient stores to carry it through the winter. Weak colonies that have failed to gather the necessary reserve should be assisted by transferring combs of sealed honey from strong hives with a surplus. An examination of the brood chamber of colonies numerically strong during the spring and summer and which recently became depleted in numbers through lack of pollen, will probably show far more honey than the bees could possibly

cover during the winter months. In such cases the side combs should be removed and replaced with empty combs. This will enable the comparatively small cluster of bees to keep the interior of the hive at an even temperature more easily than when handicapped with thick combs of cold honey which remain uncovered by the bees.

There is no set rule as to the quantity of honey that should be left for winter stores, but the requirements of each individual colony should be assessed on its numerical strength, a reasonably safe guide being to leave as much sealed honey as the colony can comfortably cover.

Ironbark has been blooming fairly well in the Tarnagulla district, but ironbark blossom is deficient in pollen and as a deterrent to the wastage which often takes place on ironbark during the early autumn, migratory apiarists should remove their bees to stringybark, or other pollen-bearing flora as soon as possible. Wastage can also be counteracted by removing all stores including that in the brood chamber from hives working on ironbark with full combs gathered from scrub, manuka, tea-tree, stringybark, or messmate.

This year the average yield in Gippsland should be about 80 lb. per colony, although yields of up to three tins have been recorded. From the ironbark in the Tarnagulla district yields varying from 30 to 90 lb. of surplus honey per colony have been obtained.

Towards the end of the month the bees should be confined to as small a space as possible by removing all spare supers. The lids should be made weather proof and fitted securely, and all grass should be chipped away from hive entrances.

[J. W. Thomlinson and W. A. Collins, Apiary Inspectors.

VETERINARY NOTES.

Avian Tuberculosis.

Avian tuberculosis is caused by a different type of tubercle bacillus from that producing tuberculosis in human beings. Under very exceptional circumstances, the avian type may cause disease in humans, but as far as is known, only thirteen cases of human infection with the avian organism have been found throughout the world. Human beings, therefore, have a formidable resistance to avian tuberculosis, and it is only the exceptional individual who becomes infected.

There is no evidence that eggs from infected hens are responsible for transmitting the disease. When avian tuberculosis has appeared in a flock there is no reason why the eggs should not be used, but the eggs should be cooked and not eaten raw.

The slaughter of all birds is usually the easiest way of eliminating the trouble. Then, should re-stocking be considered, it would be advisable to acquire birds or day-old chickens from a clean source.

It is essential to place the new birds on clean ground, as the infection remains in the soil for long periods.

As tuberculosis in live stock is a scheduled disease under the Stock Diseases Act, all cases of avian tuberculosis must be immediately reported to the Chief Inspector of Stock or to a Stock Inspector.

A pamphlet dealing with avian tuberculosis is available post free on application to the Director of Agriculture, Melbourne, C.2.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.

A migratory apiary in the Heathcote district.

Wheat Variety Trials

Tests in Mallee, Mid-Northern and East-Northern Districts

Wheat Variety Trials at the Mallee Research Station.

THE Department of Agriculture for many years has conducted trials both on its State Farms and on farmers' properties to determine the comparative yielding ability of standard varieties and new crossbred wheats for the various districts of Victoria.

Mallee.

The centre of the experimental work in the Mallee was the Research Station at Walpeup. In addition to work at Walpeup, trials had been conducted last year on the farms of Messrs. W. E. Kelly, Werrimull; A. Barbary, Woomelang; T. Atkin, Ultima; and W. Cox, Berriwillock.

Although the seasonal conditions were favorable in the western and central portions of the Mallee, as indicated by the satisfactory yields from Walpeup, in the northern and eastern sections, where rainfall was light and patchy, only moderate to low yields were obtained.

The highest yields have been obtained from the early varieties, Bencubbin and Baldmin. Both are tall-growing, white-chaffed wheats; the former, in addition to yielding well, is also a satisfactory hay type. Baldmin has the advantage that its grain produces a flour of better quality than the more commonly grown varieties. Both wheats, however, have the disadvantage of a rather weak straw, and farmers, therefore, should make certain that, if these varieties are grown, they are harvested promptly as soon as ripe. Despite its tendency to lodge, Bencubbin is increasing in popularity throughout the Mallee. Regalia, also an early type and very similar in appearance to the standard Ranee 4H, has yielded well.

The results from the main varieties at the Mallee Research Station last year, together with the average yield over the past five years, are given in the following table:—

WHEAT VARIETY TRIALS—WALPEUP.

Variety.	1941.	Average 5 Years 1937–1941.
	bus./ac.	bus./ac.
Bencubbin	36·4	29·2
Baldmin	36·8	29·2
Quadrat	35·2	28·9
Regalia	33·8	28·3
Pindar	34·8	27·7
Ranee 4H	33·4	27·5
Bobin	32·2	..
Magnet	33·9	26·5
Dundee	31·6	25·7
Ghurka	32·7	24·3

Of the later-maturing varieties, Pindar, which is a selection of Ghurka, and which it closely resembles, has done well. Pindar was released in the Mallee for the first time last

year. The flour quality produced by this variety is of a higher standard than the parent strain. Quadrat, which was released for the Wimmera and East Northern districts last year, is also a wheat of the Ghurka type, and appears to be yielding well at Walpeup.

The results from the trials in the Southern Mallee are given in the following table:—

WHEAT VARIETY TRIALS IN THE SOUTHERN MALLEE.

Variety.	WOOMELANG.		BERRIWILLOCK.		ULTIMA.
	1941.	Average 2 Years 1940–41.	1941.	Average 2 Years 1940–41.	1941.
	bus./ac.	bus./ac.	bus./ac.	bus./ac.	bus./ac.
Bencubbin	15·8	11·6	..	..	9·7
Baldmin ..	15·4	11·0	..	..	8·6
Quadrat ..	12·3	9·8	18·2	18·8	8·8
Regalia ..	16·4	11·2	15·3	15·0	9·2
Pindar ..	12·4	9·8	15·6	18·1	8·6
Ranee 4H	14·0	10·1	14·5	15·2	10·4
Bobin ..	15·9	11·8	..	..	10·0
Magnet ..	8·5	7·8	..	..	5·9
Dundee ..	10·3	8·5	..	..	7·5
Ghurka ..	9·3	8·0	15·4	17·1	9 0

In the two seasons during which tests have been conducted at the above centres, the seasonal conditions have been unfavorable, and the yields obtained have been low. The early wheats, Bencubbin, Baldmin, and Regalia, have given the highest returns, although the later varieties—Pindar and, to a lesser extent, Ghurka—have done well at Berriwillock despite the dry seasons. It is possible that, with a return to better seasons, these types may prove more suitable to this district than the earlier wheats. The variety Quadrat, which has not yet been released for the Mallee districts, yielded well at Berriwillock, but has not given such a good performance at the other two centres.

WHEAT VARIETY TRIALS—WERRIMULL.

Variety.	1941.	Average 5 Years 1937–1941.
	bus./ac.	bus./ac.
Regalia	15·6	12·0
Bencubbin	14·1	11·7
Ranee 4H	15·3	11·5
Bobin	15·1	..
Baldmin	14·0	10 9
Pindar	15·0	10·5
Ghurka	14·3	10·1
Quadrat	14·0	..
Magnet	12·2	9·8

Typical Heads of Regalia. This variety topped the Northern Mallee Trials both in 1941 and over the five-year period 1937-41.

The trials over a number of seasons in the Northern Mallee, at Werrimull, have shown that early wheats are more suitable for that district than the later types. The variety Regalia topped the yields both in 1941 and over the five-year period, with Bencubbin and Ranee 4H close behind. Seed of Regalia is available from the Mallee Research Station. The results are given in the foregoing table.

The recommendations for varieties for the Mallee may be summarized as follow: —

	General Sowing.	Limited Sowing.
Northern Mallee	Regalia ..	Bencubbin
	Ranee 4H	Baldmin
	Ghurka ..	Pindar
Central and Southern Mallee	Ghurka ..	Pindar
	Ranee 4H	Bencubbin
		Baldmin
		Dundee

Mid-Northern.

To assist the Department in its advisory work to the wheat farmers of Victoria, new wheat experiments were commenced last year at Diggora, near Rochester. Tests have been conducted by the Department for a number of years in the other main wheat districts, but, prior to this, it has not been possible to carry out trials in the central northern country. With the recent release of several new varieties it is important that the farmers of the district should have the opportunity of observing the behaviour of these wheats under local conditions.

The new plots, which are located on the farm of Messrs. J. T. Haines and Son, included a yield trial with thirteen wheat varieties, and a manurial test with varying dressings of superphosphate, both experiments being laid out on the replicated system.

Fairly dry conditions were experienced generally throughout the season in the Rochester district, but the cool finishing conditions enabled moderate returns to be obtained.

In addition to standard varieties, a number of promising crossbreds and new wheats recently bred by the Department were included in the variety trials, the results being as follow:—

DIGGORA, 1941.

Variety.	Bushels per Acre.
Wannon x Ghurka L6031 ..	22·9
Bencubbin	22·0
Ghurka x White Fife L5266 ..	21·3
Ghurka x C.M.G. W5537 ..	21·2
Bobin	21·0
Pindar	20·8
Quadrat	20·8
Ranee 4H	19·8
Dundee	19·7
Magnet	19·4
Ghurka	18·3
Regalia	18·1
Baldmin	16·4

An extended period of yield tests over a number of seasons is necessary before wheats can be recommended for any given district. It is interesting to note, however, that the new crossbreds were among the best yielders in the trial, Wannon x Ghurka L6031 actually giving the highest return of 22·9 bushels per acre.

Of the standard varieties, Bencubbin, a tall-growing early-maturing wheat, gave the top yield of 22·0 bushels per acre. This variety has done well in the drier, early-maturing districts such as the Mallee, but is weak in the straw and has a tendency to lodge. It is possible that this variety was specially suited by the dry season.

Quadrat and Pindar, two of the newly-named wheats, each returned 20·8 bushels per acre. The former is recommended at present only for sowing in the Wimmera and East-Northern districts. It is a free-stripping, brown-chaffed wheat with a strong straw, slightly taller than Ghurka, and normally producing a large, well-filled ear. Pindar, which is a selection from Ghurka, was released last year to growers in the Mallee. In that district it is superior in both yield and flour quality over the parent variety, and it is interesting to note that it has yielded better than Ghurka in this trial.

The varieties Ranee 4H, Ghurka, and Dundee, recommended at present for general sowing in the mid-northern district, gave slightly lower returns, but, because of their proved ability over a number of years, must still be regarded as the standard wheats. Baldmin, which is also recommended for limited sowing, suffered adversely at seeding from the dry conditions, and, as a result of the poor strike, did not give satisfactory yields. However, at other centres in the Northern wheat belt, this variety has given consistently good yields, and its suitability to the Rochester district should not be judged on one year's results.

Magnet, which was recently distributed in the Wimmera district, has not given any outstanding yields in the trial at Diggora this year.

DIGGORA, 1941.

Treatment.	Yield.	Increased Yield from "Super."
	bus./ac.	bus./ac.
No manure	9·2	..
Super. 60 lb./ac. ..	17·4	8·2
,, 75 ,, ..	17·4	8·2
,, 90 ,, ..	20·8	11·6
,, 120 ,, ..	22·0	12·8
,, 150 ,, ..	23·9	14·7
Super. 90 lb. + zinc 7 lb./ac.	19·7	10·5

In the wheat manurial trials, which were designed to ascertain the most payable quantity of superphosphate to use on fallowed land, an outstanding response was obtained from this fertilizer last year.

The increased yields from superphosphate fluctuate with varying seasons, and the results over an extended period have to be considered in determining the added results likely to be obtained under average conditions.

A section of the wheat experimental plots at Dookie Agricultural College.

Tests over longer periods in other portions of the Northern district indicate that the optimum dressing of superphosphate under normal conditions is in the region of 1 cwt. per acre for wheat grown on fallow.

Under the present conditions of superphosphate rationing, farmers sowing their normal acreage of wheat may be forced to use less than the optimum quantity of fertilizer. In that event, as can be seen by a study of the table, it will be found more profitable to reduce the rate per acre over the whole area sown rather than to sow part with the full quantity of superphosphate and part without fertilizer.

The trial in which zinc sulphate was tested in addition to superphosphate did not show any increase in yield over superphosphate only at Diggora last year. This mineral, when used in combination with superphosphate, has given profitable returns in parts of the Wimmera, but it is evidently not required by the soils in this district.

RECOMMENDATIONS FOR SOWING IN THE MID-NORTHERN DISTRICT.

—	General Sowing.	Limited Sowing.
Mid-Northern	Ghurka .. Ranee 4H	Dundee Baldmin

East-Northern.

Very good conditions for the growth of cereals were experienced at Dookie College, Rutherglen Experiment Farm, and at Invergordon, where variety trials in the East-Northern district were conducted by the Department. Many exceptionally heavy crops were harvested around Dookie, some farms having record yields.

Satisfactory yields were obtained from the two new varieties Quadrat and Magnet, which were released for distribution in this district last year.

On the Departmental experimental plot at Dookie College the highest yield was given by Magnet, 53·1 bushels per acre, as compared with Baldmin 51·5, Quadrat 50·1, and Ghurka 43·7.

In the Invergordon tests the top yields were Baldmin 44·4, Quadrat 44·0, and Ghurka 40·1 bushels per acre, while at Rutherglen the results were Bencubbin 37·4, Magnet 35·8, Quadrat 34·8 and Ghurka 32·9 bushels per acre.

The detailed yields for 1941 and the average results for a number of years are given in the following table, which includes both named varieties and a number of the newer crossbreds:—

WHEAT VARIETY TRIALS—EAST-NORTHERN DISTRICT.

Average Yields in bus./ac.

—	Dookie College.		Invergordon.		Rutherglen.	
	1941.	Average 4 years.	1941.	Average 4 years.	1941.	Average 4 years.
Baldmin ..	51·5	36·6	44·4	23·5	34·4	22·0
Magnet ..	53·1	37·1	42·4	22·0	35·8	22·6
Ghurka x Amity	51·0	..	..	..	35·0	..
Quadrat ..	50·1	37·0	44·0	..	34·8	22·0
Deakin x Ghurka	50·7	..	..	..	34·2	..
Ghurka x W. Fife (L)	47·2	..	..	..	35·9	..
Pindar ..	47·4	35·1	42·8	24·3	32·9	21·9
Bencubbin ..	45·2	33·5	41·2	..	37·4	..
Dundee ..	45·1	32·8	40·6	22·4	34·7	22·3
Ghurka ..	43·7	33·3	40·1	24·6	31·5	20·8
Ford ..	..	..	..	..	32·6	..
Regalia ..	45·5	..	41·9	22·5	35·1	21·7
Ranee 4H ..	43·7	31·5	37·5	22·0	32·8	20·6

Typical heads of Magnet wheat.

The wheats recommended for the eastern sector of the northern wheat belt by this Department and the Victorian Wheat Advisory Committee are Ghurka and Baldmin for main sowing, and Quadrat, Magnet, Dundee, and Ranee 4H for limited sowing. The basis of these recommendations in regard to yielding capacity are the comparative yields of variety trials conducted by the Department at the various centres, together with the experience of officers in their contacts with wheat growers.

The variety Ghurka has been the principal wheat grown in the Victorian wheat belt for a number of years, and has proved itself as a prolific grain yielder with good harvesting features and a strong, though somewhat short, straw. It is very resistant to the disease of flag smut.

Baldmin, over a period of years, has outyielded Ghurka in all trials conducted in the East-Northern country. It is a fairly tall, white-chaffed wheat of early maturity; it may develop a weakness in the straw, but a loss of grain can usually be avoided if the variety is harvested promptly.

Magnet, one of the new wheats recently recommended for this district, has given good yields at Dookie and Rutherglen for the past five years, and has the ability to give high returns in favorable seasons. This variety is late-maturing, with white chaff and a moderately tall, strong straw. It does not appear to be so well suited to the drier portions of the district.

Quadrat, the other new wheat released last year, has outyielded Ghurka on all the northern plots. Slightly taller than Ghurka, this brown-chaffed, free-stripping wheat normally produces a large, well-filled ear and attractive grain. Since this variety is somewhat similar to Ghurka, farmers who have been successful with the latter should find this new wheat variety worthy of trial.

Dundee has given moderately good results in the tests, but, since it is very susceptible to rust, it has lost favour with farmers in recent years when this disease was prevalent.

Ranee 4H has been a good yielder in the drier parts of the State, but has not given outstanding results in this section of the wheat belt, where the average annual rainfall is in the region of 17 to 22 inches.

Bencubbin is an early-maturing wheat which has yielded particularly well in the earlier-maturing districts. Because of its tall straw, this variety is also a suitable hay type, but, owing to its tendency to lodge, extensive areas should not be grown by individual farmers.

RECOMMENDATIONS FOR SOWING IN THE EAST-NORTHERN DISTRICT.

—	General Sowing.	Limited Sowing.
East-Northern	Ghurka .. Baldmin	Quadrat Magnet Dundee Ranee 4H

Victorian F.A.Q. Wheat

Analysis of 1942 Sample

By W. R. JEWELL, M.Sc., Agricultural Research Chemist

A portion of the official F.A.Q. wheat sample, made available by the Victorian Chamber of Commerce, has been critically examined as in former years. The results of analysis and of examination of milling and baking qualities are given below, together with the results for the preceding seven years for comparison.

Wheat.

The bushel weight, which was struck at 63¾ lb. is above average, and is higher than might have been expected from the seasonal conditions which induced a limited amount of rust. The sample has a pleasing appearance, the grains being mainly well filled but with a slight degree of mottling. The proportion of screenings, including grain less than 2 m.m., is slightly higher than in the past few years, and consists mainly of small and cracked grains, with a few wild oats and thistle seeds.

The season was not conducive to high quality wheat, but in spite of this, protein content is well up to average and gluten quality, as measured by Pelshenke figure, has been exceeded only twice before. In view of the season, this satisfactory state of affairs must be regarded as a result of the recent policy of improving quality.

TABLE I.—ANALYTICAL RESULTS.—WHEAT.

—	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.
Moisture (per cent.)	11·8	12·2	12·7	11·8	9·1	10·7	11·0	10·5
Impurities (screenings) (per cent.)	8·6	4·9	4·5	5·3	3·4	4·1	3·8	5·3
Ash (per cent.)	1·61	1·41	1·34	1·30	1·26	1·43	1·20	1·23
Protein (N x 5·7) (per cent.)	10·93	9·74	9·80	11·09	12·81	9·78	11·74	10·28
Bushel weight (lb.)	60	63½	62	63½	64½	63½	64¼	63¾
Pelshenke figure (minutes)	24	26	24	28	36	26	39	32

Flour.

The cleaned wheat, conditioned to 15 per cent. moisture, milled easily with a normal extraction to give a clean, bright flour with the usual low ash content.

The gluten content is rather lower than might have been expected from the protein percentage, but is of reasonably good quality; it is considerably lower in quantity and quality to that

TABLE II.—ANALYTICAL RESULTS.—FLOUR.

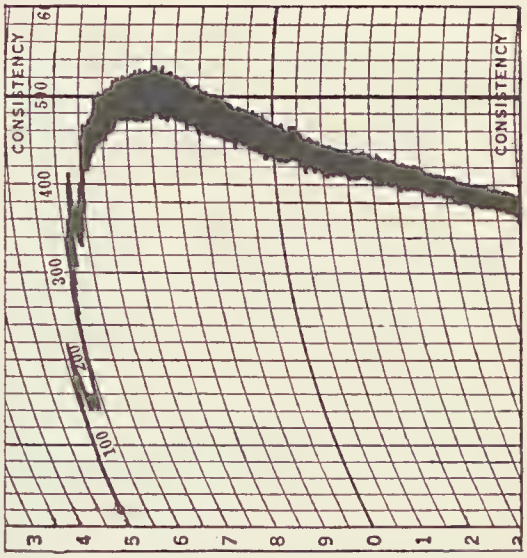
—	1935.	1936.	1937.	1938.	1939.	1940.	1941.	1942.
Moisture (per cent.)	..	..	..	11·6	11·1	12·6	12·4	13·2
Yield (per cent.)	71·7	73·6	71·3	73·8	71·3	72·9	73·2	70·0
Ash (per cent.)	0·56	0·48	0·50	0·48	0·54	0·48	0·47	0·48
Protein (N x 5·7) (per cent.)	9·39	9·0	9·12	9·92	11·17	8·78	10·43	9·04
Wet gluten (per cent.)	26·8	27·4	26·4	30·4	38·7	28·8	30·8	25·7
Dry gluten (per cent.)	9·1	9·1	8·4	9·9	12·2	9·5	10·4	8·6
Water absorption—								
Hand (per cent.)	50·6	50·0	50·2	50·6	50·0	50·2	52·5	51·5
Farinograph (per cent.)	..	..	..	54·5	63·0	57·4	61·8	57·5
Maltose figure	84	159	142	152	168	155	152	142
Valorimeter No. (farinograph)	..	..	..	34	46	42	44	38

of last season which was exceptional because of rather droughty conditions.

The flour was tested in the Brabender Farinograph and the diagram obtained is shown in the illustration. The curve shows a rather long mixing period, with fair stability and elasticity, and is generally well balanced. It suggests a satisfactory baker's flour and the type of curve indicates the presence of a higher proportion of high quality wheats than was the case of a few years ago.

The results of the standard baking tests are given in Table III.

As would be expected, baking tests are not of such a high standard as last year. The "basic" loaf was mature and of good appearance and texture. The malt-phosphate addition has caused an increase in loaf volume indicating that, as usual, an improvement in baking can be effected by increasing diastatic activity by the addition of yeast foods. The flour failed to give a response to the addition of bromate, suggesting that this season's flour will not improve much with age. However, these baking results, together with some supplementary tests, indicate that the F.A.Q. wheat this year, while lower in baking quality because of seasonal conditions, will give a flour which should prove satisfactory in the bakehouse.



Farinogram for 1942 sample of F.A.Q. wheat.

Normal yields of bran and pollard were obtained, both of which were found to have an analysis complying with their respective standards under the Stock Foods Act.

TABLE III.—BAKING TESTS (100 GRM. FLOUR.)

Procedure.	Loaf Volume in c.c.					
	1937.	1938.	1939.	1940.	1941.	1942.
Basic	395	450	397	392	442	440
Basic % malt % phosphate	440	510	475	460	517	475
Basic % malt % phosphate % bromate ..	385	490	517	497	561	460

Certified Pullorum-free Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Number.	Owner.	Date of Certification.	Number of Birds.
1	Reformatory Prison, Castlemaine	6th March, 1942 ..	200
2	"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26th March, 1942 ..	927

Excessive Leaf-fall of Citrus Trees

By Officers of the Horticultural Division and the Chemist's Branch

IT is a natural process for citrus trees to lose some of their leaves each spring, but usually a rapid development of new growth repairs this loss. Excessive defoliation has been investigated previously in the Swan Hill district (1), and at Bamawm (2), where it was shown that the most common causes were soil salinity and inadequate or excessive soil moisture. However, as leaf-fall in the northern districts of Victoria was more noticeable last spring than in previous years, a further survey was made by Departmental officers. This confirmed earlier conclusions, but showed that seasonal conditions were responsible for the increased severity of defoliation.

An instance of severe defoliation.

In cases of less severe defoliation, new growth has now given the trees a healthy appearance, but in some groves, strong new growth has failed to replace the fallen leaves, and the trees appear to be permanently affected. Some of the more important factors which have contributed to severe defoliation are discussed below.

Climatic Factors.

Several climatic factors contributed to the unusually heavy leaf-fall last year. First and foremost, the lighter-than-normal rainfall and absence of soaking rains in northern Victoria resulted in very dry soil conditions towards the end of the winter, and caused an early leaf-fall. Where green manure crops were grown, the light showers of rain that did fall were used by the crop and were of no benefit to the trees. Furthermore, drought conditions, by reducing soil moisture, raised the concentration of salt in the soil solution and caused some cases of salt injury, even where the salt content of the soil was not considered dangerous. For example, soil which, at its field capacity (say 20 per cent. moisture), contains 20 parts of salt per 100,000 parts of soil has actually 100 parts of salt per 100,000 parts of soil moisture, since all the salt is dissolved in the soil moisture. At its wilting point (say 10 per cent. moisture), this increases to 200 parts of salt per 100,000 parts of soil moisture. Thus, as the soil dries below its field capacity, the salt in it becomes more injurious.

Although frosts were not generally severe last winter, groves in certain well-known frost pockets suffered rather heavily from leaf-fall as a result of the few which did occur. The damaging effects of winds, which were stronger and more prevalent than usual, were particularly noticeable on exposed groves and on trees on the windward side. Dry soil conditions favored the action of both of these agents.

It is known that in the hottest part of a summer's day the loss of water from the leaves quite often exceeds the uptake by the roots, and that the leaves may draw temporarily on the fruit for moisture. This loss from the fruit is made up in the cool of the evening when transpiration from the leaves is less. Crops generally were light last season, and, during the long dry spell of 1941, the leaves did not have such a large moisture reservoir available. It would appear that this contributed to the leaf-fall in the early spring.

Soil and Irrigation.

Trees affected by winter dryness, or winds and frosts, have now thrown out new growth, and those in soil with moderate salt content are recovering also. Where recovery of the trees has not followed severe defoliation, it is usually obvious that soil or irrigation factors, or both, have been at fault.

Very few citrus groves are on soil types immune from irrigation troubles. Citrus trees thrive best on light soils with natural free drainage, but many groves are established on quite heavy soil types. On the heavy grey clay soils of Tyntynder and Murrabit, unsatisfactory water penetration rather than inherent soil salinity is the main factor affecting tree growth. Irrigation and soil investigations at Murrabit (3) demonstrated the difficulty of obtaining satisfactory wetting of the whole root zone. The salt content of leaves taken in the spring from defoliating trees (table 1) shows that, except in two cases (locations 1 and 7), salt in the leaves is normal and, therefore, that soil salinity was not the cause of leaf-fall.

Table 1.—Salt Content of Leaves from Defoliating Citrus Trees at Murrabit (1941).

Location.	*Sodium Chloride in Dried Leaves.* Per cent.
1	2.92
2	0.20
3	0.32
4	0.75
5	0.32
6	0.59
7	1.98

Two-furrow method of irrigation is not recommended.

It was mainly at Murrabit that groves exhibited excessive leaf-fall for the first time. Insufficient winter rainfall on soils that probably lacked adequate moisture reserves allowed excessive drying out of the soil and consequent defoliation in the spring.

Table 2.—Salt Content of Citrus Leaves from Badly Defoliated Trees (1941).

Location.	*Sodium Chloride in Dried Leaves.* Per cent.
1	2.9
8	4.8
9	4.5
10	5.6
11	3.9

Most of the soils of Tresco, Long Lake, and Kangaroo Lake belong to the Tatchera series, which covers a fairly wide range of textures. Trees growing on the lightest types, which are found on the ridges, have generally escaped trouble, but with increasingly heavy soil texture down the ridges defoliation has become evident. Many of these soils are inherently saline, and the trees have shown defoliation for some years. Careful attention to irrigation in such cases is required, but the changes in soil texture make the matter difficult. In order to water adequately the bottom of the run, the lighter soil near the head ditch is frequently overwatered, with consequent development of a water-table. In this way salt, which may have been originally at considerable depth, enters the ground water and can be brought within the root zone of the trees. The upward rise of the salt through the soil can be continued still further by capillary action from this free water surface. Many groves have been destroyed in this way, and others seriously injured. Table 2 above shows the very high salt content of leaves from trees in some such groves.

Instances have occurred, particularly in the Mildura district, where severe leaf-fall was associated with still another soil condition, namely, recent drainage of the block. The absence of salt was shown by a leaf analysis. The presence of a shallow water-table prior to drainage caused the death of the deeper roots, and forced the trees to depend on a surface

root system feeding in soil kept moist by the water-table. Drainage resulted in a lowering of the water-table and more rapid drying-out of the surface soil between irrigations, so that while deeper feeding roots are forming the trees have suffered from water shortage, and will continue to suffer unless lighter and more frequent waterings are given.

Irrigation Water.

It was suggested by some growers that a high salt concentration in the irrigation water supplied to groves had been responsible for the trouble, but analyses available indicated that leaf-fall had occurred in many places where irrigation water was practically free from salt, and in no case did the concentration of salt appear sufficiently high to cause a sudden defoliation.

Salt-affected citrus land may be planted to more salt-tolerant plants, such as vines.

Fungous Diseases.

Growers are well aware of the symptoms and effects of collar and root rots, and the part which these diseases of the trunk and roots may play in increasing leaf-fall. It was suggested in certain producing districts that leaf-fall had been caused by the action of one of these fungi or of the stem-end rot fungus. They are often found in the tissues of citrus branches, and often cause rots in citrus fruits in storage, and, in the case of Alternaria species, the dropping of immature fruits in the summer months. While it was not considered that this was likely to be an important factor last year, leaves were examined for such fungi; but they were not found.

Remedial Measures.

As defoliation was found to be largely attributable to lack of soil moisture during the winter, the necessity for examining the soil in winter and early spring is obvious, particularly in the case of heavy soils where water penetration is difficult to obtain. A light irrigation as early as July may be necessary, if indicated by soil moisture conditions as determined by the soil auger. Some growers at Murrabit who gave light irrigations during the winter were not troubled by defoliation. Such an early irrigation will have the added advantage of redistributing any salt accumulation before the trees have resumed normal growth activities.

Damage by wind may be largely eliminated by breakwinds. A system of oil or briquette heaters is the commonest method of protection against frost.

Groves slightly affected by salt can be maintained in a productive condition by frequent light irrigations. Unusually prolonged dry periods such as occurred last winter may cause a severe leaf-fall in such groves unless irrigation is maintained. Where citrus trees are unthrifty and sparse in foliage as the result of high salt accumulation in the soil, any attempt at reclamation probably would be only partially successful and would not be economic. After chemical analyses have confirmed the presence of much salt, such areas should be planted with some more salt-tolerant crop. Vines are suitable for this purpose, provided salt concentrations are not too high. It must be remembered that such soils will require careful irrigation if further salt accumulation is to be prevented.

Safe and satisfactory irrigation may be expected by adopting the practices described below. They have been developed by the detailed investigational work at Tresco (4) and at Merbein (5).

1. Two and three-furrow irrigations, which are commonly practised, fail to wet the soil beneath the trees thoroughly, and may carry salt towards the tree trunks and leave it there. Therefore spray, flood, or multi-furrow irrigation is much safer. The spray irrigation system is the most satisfactory method of applying water, provided the capacity of the plant installed is large enough for the area to be watered; under-irrigation has at times been the cause of further decline where this system has been installed. It has been shown (5) that the level of free water is kept low and that the soil salinity may be greatly reduced by spray

Use the soil auger to determine soil-moisture conditions.

irrigation; it is, however, costly to install. The flood and multi-furrow systems are more practical methods. All three methods have the advantage of completely "blacking-out" the soil surface before the downward penetration of water to a dangerous depth can occur, and washing downward any salt which may be present in the root zone, redistributing it in depth.

2. The length of run on light soils should be limited to 3 or 4 chains. Many groves in the Murray Valley have runs much too long. In irrigating long runs, either the top of the bay is overwatered, with probable development of a water-table, or the bottom suffers from lack of water. Even distribution of water along the run is always difficult unless the length of run is correct for the type of soil being irrigated. Where water penetration is rapid, as in sandy soils, a much shorter run is required to obtain this even distribution than is required on heavier types. Use of the soil auger to determine the depth of water penetration at points along the run will give information as to the most suitable length of run to use.

3. Regular auger examinations of the soil should also be made to help in timing irrigations, and to detect readily the presence or rise in level of free water in soil. A much easier method of watching the level of the water-table is to install test wells 6 or 8 feet deep. These may be dug with a 3-in. or 4-in. post-hole digger, and lined with perforated galvanized-iron downpipes sealed at the bottom.

4. Soil type is of first importance in deciding whether underground drainage will be effective, and although certain broad principles can be outlined, each grove requires individual attention. On lighter soil types with a permeable subsoil, drainage has been shown (5) to lower the water-table and assist in the removal of large quantities of salt, and many groves on such soils have responded to tile drainage. It should be remembered that leaching the soil to remove salt also removes valuable plant foods, and liberal applications of fertilizer are required to replace them. Drainage of heavy clay types is quite impracticable, and it has been shown (4) that even in certain intermediate soil types in the Murray Valley, with an impermeable clay subsoil, drainage is comparatively ineffective, and that the growing of a winter and a summer cover crop is a more practical method of lowering a persistent water-table, which should thereafter be avoided by better irrigation methods.

While any attempt at reclamation of salt-affected trees is in progress, it is wise to reduce the strain on the limited root systems of the trees by pruning the tops.

On soils which are not yet affected by salt, the same technique of flood or multi-furrow irrigation, short runs, and control of irrigation with the aid of the soil auger will reduce to a minimum the danger of creating a water-table and its attendant ills.

References.

(1) F. Penman and J. L. Provan.—The *Journal of the Department of Agriculture, Victoria*, Vol. 34, Pt. 6, p. 279. "Defoliation of Citrus."

(2) F. Penman.—*Ibid.*, Vol. 34, Pt. 8, p. 399. "Soil Conditions at Bamawm and Ballendella in Relation to Citrus Growth."

(3) J. K. Skene.—Departmental Report, 1939.

(4) F. M. Read.—

(*a*) The *Journal of the Department of Agriculture, Victoria*; Vol. 28, Pt. 2, Feb. 1930. "'Soil Alkali' Investigations at Tresco."

(*b*) *Ibid.*, Vol. 29, Pt. 11, Nov. 1931. "An Investigation of the Non-thrifty Condition of Citrus Trees at Tresco."

(*c*) *Ibid.*, Vol. 31, Pt. 3, Mar. 1933. "Drainage Investigation on the Experimental Citrus Grove at Tresco 1926-31."

(5) J. E. Thomas.—C.S. & I.R. Bull., No. 128, 1939. "An Investigation of the Problems of Salt Accumulation on a Mallee Soil in the Murray Valley Irrigation Area."

In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Green Manuring.

ALTHOUGH March is definitely the best month for green manuring, labour shortage in many orchards will mean that this practice will have been delayed. There is still time to plant crops in most districts, and in this issue of the *Journal of Agriculture* a summary of tests in various fruit-growing districts, together with recommendations for growing of green manure crops, are given. Where growers do not intend to plant green crops, ploughing, except for a drainage furrow in the centre of each land, should be delayed until the early spring. This will enable the weeds to grow and provide a natural cover crop during the winter months. Weed growth may be stimulated by applications of artificial fertilizers such as superphosphate and sulphate of ammonia, top-dressed at the rate of 2 cwt. to the acre, if these fertilizers are available. Applications of poultry manure broadcast at the rate of ¼ bag to the tree would achieve the same effect. Although of less value than a green manure crop of leguminous plants, weeds are better than bare soil during the winter, and for hilly districts in particular this growth of miscellaneous herbage is of great assistance in erosion control. In flat irrigated areas, such as the Goulburn Valley, ploughing is recommended in the autumn to turn under the crop of summer growing grasses and weeds which have been allowed to develop during the past few months.

Codling Moth.

The codling moth usually is less troublesome during this month, its activities being confined to grubs leaving infected fruit and seeking winter quarters. Growers using hessian or bag bandages should not neglect inspection and destruction of larvae. After the final inspection, which should take place at the end of this month, some growers replace the bands on the trees in order to trap larvae disturbed during cultivation from their refuge in clods of soil.

Navel Oranges.

Citrus growers in Northern districts will probably commence picking Navel oranges towards the end of the month.

As the maturity of most varieties of fruit has been delayed this season, growers should submit samples of oranges to packing houses for maturity tests in order to avoid rejection at the market. The use of ethylene gas to hasten the development

of the mature colour of Navel oranges should not be attempted until it is certain that the formation of the pigment has already commenced in the skin of the fruit. "Gassing" before this process has started will result in pale, anaemic-coloured oranges, and it would be wise to determine when the fruit has reached the correct stage by preliminary trials. Tests conducted last year showed that a concentration of 1 cubic foot of ethylene gas in 10,000 cubic feet of air space is sufficient to colour the fruit, provided that the humidity of the chamber is kept at a high level by placing a vessel of water inside. If necessary, the chambers are heated in cold weather by the use of electric radiators.

Some attention should be given to the control of pests and diseases in citrus trees. For the control of Soft Brown or Black Scale and Sooty Mould which occurs with scale infection, a spray of white oil at a strength of 1 in 40 may be applied during the month. Collar Rot, a disease causing some losses of citrus trees may be reduced considerably by keeping the trunks of trees free from rubbish and vegetation. When any infection is noticed, the diseased area should be cut away until only healthy wood and bark remain. This wound should be covered with a Bordeaux paste, made by mixing equal parts of bluestone and Limil with water until a paste of creamy thickness is obtained.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

Winter-flowering Annuals.

WINTER-FLOWERING annuals may be planted this month, but early planting is desirable so that they will be well established before the soil becomes too cold. Seedlings of Iceland poppy, calendula, nemsia, viola, pansy, cineraria, and primula malacoides should be planted in well-prepared soil and preferably in raised beds to provide surface drainage during the winter months. If blood and bone fertilizer, at the rate of 3 oz. per square yard, is added to the soil when preparing the beds it will assist the growth of these plants before winter sets in. Cinerarias should be planted under shrubs, trees, palms or the over-hanging eaves of a building, to ensure some protection from frosts. They require plenty of light, and if the situation is a dry one they will need frequent waterings also, to produce the best results.

Winter-flowering stocks and sweet peas should be planted as soon as possible. Choose a warm sunny situation for these plants and dig into the soil a liberal quantity of stable manure. The sweet peas will also benefit from a light application—about 1 to 2 oz. per square yard—of superphosphate, or 2 oz. of market-garden manure.

Ranunculi and anemone corms may be planted in an open, sunny position. They should be planted 1 to 1½ inches deep and 6 inches apart to obtain a bright bedding effect. Water well, but avoid badly drained situations. As soon as the young leaves appear, weed the beds and cover with a light mulch of well-rotted horse or cow manure. Keep the surface free from weeds by light hoeing.

Garden Refuse as Manure.

At this time of the year there is a lot of cleaning up to to be done in the garden. Leaves, dead plants, light prunings, &c., are valuable at the present time when horse and cow manures are so difficult to obtain. Such rubbish should be placed in a compost heap in an out-of-the-way corner of the garden, to rot down and later be returned to the soil to assist in maintaining its fertility. The method used in making these compost heaps is to place a thin layer of stable or poultry manure on a layer of garden rubbish, about 1 foot thick, then another layer of rubbish—followed by a layer of manure. Water these layers thoroughly and continue the building of the heap by alternate layers and waterings. Allow it to stand for about three weeks, and then turn it, mix and re-build the heap; water if necessary, but do not make the material too wet at this stage. In about one month's time, the heap should be turned again. When well-decomposed, it is ready to add to the garden, either as a mulch or by turning it into the soil.

Control of Snails.

Snails will be plentiful in the garden now, and they should be attacked with baits before much damage is done. Baits can be made by grinding to a fine powder three tablets of solid fuel, containing metaldehyde, obtained from the ironmonger, and mixing this with 1 lb. of bran. Mix thoroughly and then add sufficient water to make a crumbly mash. Place small lumps of this around the garden in the evening, paying particular attention to those places where snails are sheltering.

Another useful bait for snails can be made by mixing a tablespoonful of calcium arsenate with 1 lb. of bran and then dissolving a tablespoonful of molasses or treacle in about half to three-quarters of a pint of hot water and adding this to the bran and calcium arsenate until the bran is wet and crumbly. This mixture is then broadcast in the garden.

VEGETABLE GROWING.

Asparagus.

When the tops of asparagus commence to die, they should be cut back to about ground level and the surface of the beds forked over. Suppress weed growth on the beds during winter by light forking. In the autumn, the green shoots with their bright red seeds provide a useful ornament for indoor decoration. The seed may be extracted by pulping the berries and washing the fleshy parts through a sieve fine enough to retain the seed. Dry the seed by spreading on cloth or hessian, rubbing it occasionally to prevent it sticking. Store in a dry place until October, when it can be planted in a seed-bed. The seed germinates easily and the young seedlings can become so troublesome on the mature asparagus bed that growers sometimes prefer to cut the seed-bearing shoots before the seed falls.

Rhubarb.

Winter varieties of rhubarb may be planted now. The rhubarb is a deep-rooting plant which flourishes in a deeply cultivated, rich, well-drained soil. When preparing the bed for this plant, dig in a good supply of well-rotted stable manure After rhubarb beds have been producing for five or six years, the quality of the stalks often deteriorates. Where this has occurred, place a liberal dressing of stable manure and blood and bone manure around the plants, and dig it under deeply with a spade, digging even close to the plants. This will stimulate the old crowns, and the stalks will be of a better quality. Pieces of the crown, including buds and roots, may be cut off for planting elsewhere. This pruning also stimulates old plants. Good winter varieties of rhubarb are **Toop's Winter,** and **Keck's Wonderful.** Plants should be placed 3 or 4 feet apart, and the crown should be just below the surface of the soil.

Onions.

Onion seed may be planted in seed beds for transplanting in July, and onion seedlings can be planted out now in rows 15 inches apart and 6 inches between each plant. The tops and the roots should be cut when transplanting. About half an inch of roots is allowed to remain on the plant when transplanting, and the base of the plants and roots only should be in the soil. Onions are a shallow-rooting crop, therefore cultivate lightly and weed carefully while the weeds are still very small, otherwise they compete with the crop for food. **Early White, Brown Spanish** and **Brown Globe** are popular varieties.

Lettuce.

Practically the only variety of lettuce that can be sown now is "Imperial D."

A crop of onion seed for Great Britain grown by the late Mr. J. Adams, of Bairnsdale.

Mr. Adams, who served in the 1914-1918 world war, died before the crop was mature. The seed was harvested by a neighbour.

GREEN MANURE CROPS

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer

DURING the autumn of 1941, green manure crops were sown on the various apple and pear demonstration plots conducted by the Department of Agriculture throughout the State.

Rates of seeding and fertilizer application are set out in the accompanying table.

The figure in the last column is included because it provides an easy means of calculating the weight of seed or fertilizer required for each land of a given number of trees in length.

The weight of seed or fertilizer required per land = factor × number of trees per land. For instance the weight of tick beans required for a land of twenty trees equals 20 × ·66 or 13·2 lb. per land.

An excellent crop of tick beans grown at Batesford.

Seed or Fertilizer.	Bushel Weight.	Rate per Acre.	Factor for 16 ft. width of land.
	lb.	bushels	
Tick beans	60	1½	·66
Peas, Barley } Mixed ..	60	¾	·33
	50	½	·18
Oats	40	1½	·44
Ryecorn	60	1	·44
Golden tares	60	1½	·66
Lupins	60	1½	·66
Ryecorn, Tares } Mixed	60	½	·22
	60	¾	·33
		lb.	
Mustard	..	6	·04
Rape	..	6	·04
		cwt.	
Sulphate of ammonia or super.	..	1	·83
	..	2	1·65
		tons	
Lime	..	2	32·8

The season was not entirely favorable for the growth of crops. The long, dry autumn resulted in crops being sown later than was desirable. In most northern districts the dry weather continued well on into the winter, and the crops grown at Harcourt and in the Goulburn Valley were not successful.

In the south, despite the late sowing, more favorable weather was experienced, and on some properties a very satisfactory growth was obtained. These crops are grown chiefly for green manure on the various apple and pear fertilizer experimental trials which are conducted in various fruitgrowing districts. Additional plots were established in order to determine the best fertilizer dressing or type of crop by small scale trials.

In certain instances a measure of the yield of greenstuff under the various treatments was obtained by cutting and weighing the growth from a number of plots of one square yard in area in each land. As alternate lands only were sown down to a width of sixteen feet, the yield figures quoted are for an acre of orchard so treated and not an acre of planted area. Although the trials were not set out to allow statistical treatment, it is considered that the differences obtained were sufficient to give some information on the fertilizer requirements of the crops.

New Zealand blue lupins grown at Batesford.

The results obtained during the past year are submitted with the object of serving as a guide for growers in the various districts mentioned.

Batesford.

Varieties.	Fertilizer.	Time of Sowing.
N.Z. blue lupins Tick beans	Superphosphate 2 cwt. per acre	Early May

The Batesford property is situated on an alluvial flat on the Moorabool river. The soil is rich and well-suited for intensive cultivation, consequently the growth of the crop was good. Tick beans reached a height of over five feet. Lupins grown in the same plot were poor in contrast. Some patches were over three feet high, but the majority of the growth was under eighteen inches. Examination of the roots revealed that nodules had developed freely on the beans. On the roots of the lupins nodules were present, but where growth was poor they were very scarce.

Croydon.

Varieties.	Fertilizer.	Time of Sowing.
Rye and tares Peas and barley	Superphosphate 2 cwt. per acre	Early May

The crop on the Croydon plot failed, and up to the present time difficulty has been experienced in establishing a successful crop on this property. In 1940, of the various plants sown for green manure, a single land of ryecorn alone produced a good crop.

In 1941 late sowing when nitrates in the surface soil were low and the soil temperature was dropping were factors acting against the success of the crop. The wet conditions, which continued throughout the winter, caused water-logging of the soil on this plot, and although every second land is tile drained, and the drains were flowing, it was noticed that puddles were lying in the orchard for weeks at a time. Consequently, growth was inhibited despite the satisfactory germination. It was not possible to try additional fertilizers on this plot because of a possible interference with the established fertilizer experiment. However, it was noticed that the only sites where reasonable growth occurred were on the ridges of higher land adjacent to trees receiving applications of either sulphate of ammonia or complete (4 : 4 : 1) fertilizer.

Doncaster.

Varieties.	Fertilizer.	Time of Sowing.
Peas and barley (mixed)	Superphosphate 2 cwt. per acre; sulphate of ammonia 2 cwt. per acre. Lime Dressing. Ground limestone, 2 tons per acre.	April 24th

The Doncaster property has received large amounts of various fertilizers and manures over a period of years. The slope of the particular plot on which the crop was sown is fairly steep so that waterlogging is not a problem. Under these conditions it has been possible to grow successful crops on this plot.

Various fertilizer treatments were applied and the rate of sowing was varied. Under all treatments the crop presented a healthy appearance.

The following results were obtained :—

(*a*) Peas and barley + super. (2 cwt. per acre), 2·42 tons per acre.

(*b*) Peas and barley + super. + lime, 3·95 tons per acre.

(*c*) Peas and barley at double rate of sowing, i.e., 1½ bushels peas and 1 bushel barley per acre, 4·46 tons per acre.

(*d*) Peas and barley + super. and sulphate of ammonia, 4·16 tons per acre.

The differences in yield between treatments (*b*), (*c*), and (*d*) are not great enough to indicate that any one of these treatments is better than the other, but it is obvious that all are a distinct improvement on the use of super. alone. The peas were the dominant component of the crop, except where sulphate of ammonia had been applied, in which case the growth of barley was about equal to the peas.

Panton Hill.

Varieties.	Fertilizer.	Time of Sowing.
Rye and tares White mustard	Superphosphate 2 cwt. per acre; sulphate of ammonia 2 cwt. per acre.	Mid-April

The rye and tares grew well where sulphate of ammonia was applied, although the rye was the dominant component of the crop. The growth on the manurial experimental plots, which had received applications of sulphate of ammonia and complete fertilizer, was satisfactory also, and when the crop was ploughed under in late October, the rye on these situations was about six feet high.

The mustard germinated well, but apparently the rate of sowing (one pound to a row of 23 trees) was too light, because the growth was sparse. The growing period of the crop is fairly short, and it was flowering in September. Sown at a heavier rate this plant may have possibilities for green manure.

Scoresby.

Varieties.	Fertilizer.	Time of Sowing.
Peas and barley Tick beans N.Z. blue lupins	Sulphate of ammonia, 2 cwt. per acre; superphosphate, 2 cwt. per acre.	Late April

Lime Dressing.

Ground limestone, 2 tons per acre.

The crops on the Scoresby property grew fairly well, particularly where sulphate of ammonia and ground limestone had been applied. The lupins were very poor, and from the very few nodules present on the roots it was apparent that the correct strain of bacteria was not present in the soil.

The following are the yields per acre under the various treatments:—

Peas, barley + super., 1·83 tons per acre.

Peas, barley + lime and super., 2·63 tons per acre.

Peas, barley + sulphate of ammonia + super., 3·81 tons per acre.

Tick beans + super., 4·81 tons per acre.

Tick beans + sulphate of ammonia + super., 6·93 tons per acre.

The beneficial effect produced by applications of sulphate of ammonia to both varieties of crop is obvious from these results.

Burnley Gardens.

Varieties.	Fertilizer.	Time of Sowing.
Tick beans Blue lupins Oates and tares Peas and barley	Superphosphate, 2 cwt. per acre.	Late May

Despite the fact that the crop at Burnley was not sown until late in the year, the growth was eighteen inches to two feet high. Tick beans provided the greatest bulk. The blue lupins were patchy in growth. The strong plants showed better nodule development than the weak ones. Oats–tares and peas–barley mixtures grew equally well.

Crop of rye and tares at Stanley. Left—Super. + sulphate of ammonia + limestone. Right—Super. + limestone.

Tyabb (A).

Varieties.	Fertilizer.	Time of Sowing.
Peas and barley	Superphosphate, 2 cwt. per acre; sulphate of ammonia, 2 cwt. per acre.	Late April
	Lime Dressing.	
	Ground limestone, 2 tons per acre.	

Applications of sulphate of ammonia and ground limestone produced considerably higher yields than super. alone. The crop here grew to a height of three to four feet where these extra treatments were applied.

Tyabb (B).

Varieties.	Fertilizer.	Time of Sowing.
Tick beans .. Oats and tares Lupins	Superphosphate, 2 cwt. per acre.	Late April

Beans produced the greatest bulk of green stuff. Lupins grown alongside were poor in contrast, and lack of nodule formation appeared to be a factor operating against the success of this crop. Oats and tares produced satisfactory growth.

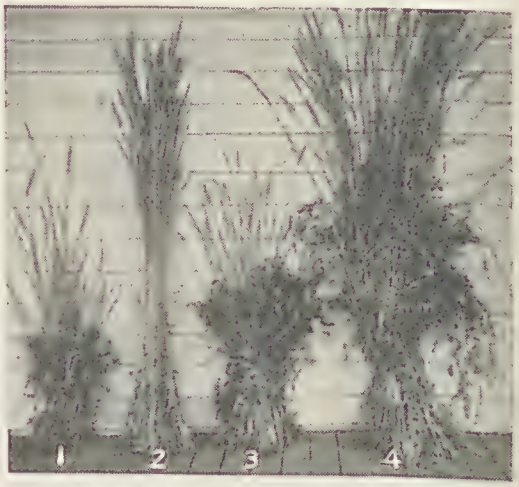
Red Hill.

Varieties.	Fertilizer.	Time of Sowing.
Rye and tares	Superphosphate, 2 cwt. per acre.	Late April

The red soil on the property at Red Hill appears to be more fertile than that of most other Victorian orchards, and recent nitrate analyses bear out this fact, i.e., nitrate nitrogen in soil samples taken in November on the sulphate of ammonia plots from the three manurial trials at Panton Hill, Shepparton, and Red Hill were respectively nil, 7·4, and 55·9 parts per million.

In spite of this fact, the old winter climate in this district deters plant growth, and it is very necessary to plant a green crop as early as possible if a reasonable amount of bulk is to be produced.

The late planting of the green crop consequently did not permit of growth before the winter. Before the crop was ploughed under in October, a reasonable growth of crop was obtained, particularly where sulphate of ammonia or complete fertilizer had been applied on the manurial plot. The tares grew equally as well as the ryecorn and the crop was over two feet in height on the manurial plots.



Samples of rye and tares from treatments 1 to 4 at Stanley (see text).

Stanley.

Varieties.	Fertilizer.	Time of Sowing.
Rye and tares	Fertilizer treatments see below.	Early May

The crop at Stanley was sown with various manurial treatments and rather outstanding results were obtained. The rocks in this area are Upper Ordovician in origin and the soil is high in iron content. It is fairly deep and seems well suited to fruitgrowing. Growing of green crops is difficult because of the cold winter weather, the altitude being 2,500 feet. The success obtained with ryecorn during the previous year prompted the use of this cereal with tares. Treatments and effects on crop were as follows :—

1. *Super. alone.*—Very poor growth not exceeding one foot in height. Yield, 0·6 tons per acre.

2. *Super. and sulphate of ammonia.*—(2 cwt. per acre.) Marked increase in growth of rye but no corresponding increase in tares. Yield, 2·5 tons per acre.

3. *Super. and lime.*—(2 tons ground limestone per acre.) Healthy growth of tares but rye not very much better than where grown with super. alone. Yield, 2·2 tons per acre.

4. *Super. and lime and sulphate of ammonia.*—Excellent growth of rye to six feet and tares to three feet. Yield, 4·8 tons per acre.

The various treatments were striking to the eye, and were an outstanding example of the effect of lime on leguminous crops and also the beneficial effect obtained on growth by using a combination of lime and sulphate of ammonia. The application of these two substances on soils in this district seems necessary in order to secure a reasonable crop growth.

Summary.

During the winter of 1941, various green manure crops were grown throughout the State. Crops in Northern districts were not satisfactory because of the dry winter. In southern districts, where the rainfall was heavier, good growth was obtained.

Several varieties of crops were grown in each district. Satisfactory results were obtained with tick beans, mixtures of peas and barley and rye and tares. The use of ryecorn as the cereal component appears to be most satisfactory in the cooler districts. Lupins were not satisfactory, and apparently inoculation of seed is required.

Applications of sulphate of ammonia produced increases in growth in all cases where these were applied and in certain instances such applications appeared to be necessary for satisfactory growth.

Lime dressings were followed by good effects on several properties.

Tubercle Free Herds

The following herds have been declared free of tuberculosis under the scheme conducted by the Department of Agriculture. Under this scheme a tuberculosis-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp...	Ballarat	63	Onley, W. H. ..	"Glenholme," Caldermeade	50
Banyule Stud Pty. Ltd.	Heidelberg	41			
Dennis, Mrs. A. A. ..	Frankston	33	Payne, A. E. T. ..	"Yarra View," Lilydale	77
Dookie Agricultural College	Dookie	77			
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15	Payne, T. E. N. ..	"Woodburn," Kilmore	58
Geelong Grammar School	Corio	58	Powell, T. S. ..	"Carellen," Mansfield	46
Gorman, A. W. ..	"Cathcart," Alexandra	61	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield ..	30
Holloway, R. W. ..	Caldermeade ..	70	Samuel, Misses G. and E.	Lang Lang ..	48
Kilmany Park Farm Home for Boys	Sale	94	School of Horticulture..	Burnley	9
Lawrence, F. H. ..	"Rainga," Tarrawarra	72	State Experiment Farm	Rutherglen ..	40
Longerenong Agricultural College	Dooen	47	State Research Farm ..	Werribee	229
			Wells, W. G. ..	Caldermeade ..	62

In addition to the above-mentioned herds there are 156 commercial dairy herds containing 6,214 head of cattle which may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

There are also 74 herds in which 3,439 head of cattle have passed one test, and may be considered, therefore to be in process of becoming tuberculosis-free herds.

A Study of Pig Litter Records

By L. A. DOWNEY, H.D.A., Pig Expert.

DURING 1940 and 1941 officers of the Department of Agriculture weighed 51 litters of pigs throughout Victoria in connexion with the annual pig-raising competitions in which awards were made on the weight of the litter at 56 days old, rate of growth to slaughter, and carcass quality of pigs selected from the recorded litters.

Several breeds and first crosses were represented, but 36 of the 51 litters were pure-bred Large Whites. The pigs were raised on 14 different farms under varying environments. To some extent the litters were selected for competition, and their treatment was better than that usually adopted.

The total weight of the litters at 56 days old ranged from 160 lb. to 453 lb. The average weight per pig within the litters ranged from 22·8 lb. to 49·5 lb. The number of pigs reared per litter varied from 5 to 12.

In Tables 1 and 2 the litters are grouped and classified according to total weight and according to the number of pigs reared.

Reference to the tables shows that heavy litter weights were associated with large numbers of pigs per litter. In the competitions the total litter weight was taken as a measure of production. Table 2 shows that a large number of pigs per litter did not result in a lower average weight per pig; in fact, litters of 9 or more pigs had a higher average weight per pig than did litters of less than 9 pigs. This is an important point, in view of the fact that heavy weaning weight in a pig is favourable to the development of lean meat.

A litter putting on weight.

TABLE 1.—CLASSIFICATION OF LITTERS INTO WEIGHT GROUPS AT 56 DAYS OLD.

—	Number of Litters.	Average Weight of Litters.	Average Number of Pigs per Litter.	Average Weight per Pig.	Breeding.
		lb.		lb.	
Under 200 lb. ..	7	166·1	6·2	26·3	3 Berkshire 1 Mid. White 3 Large White
200 lb. to 250 lb. ..	5	207·2	6·6	31·3	1 Mid. White 4 Large White
251 lb. to 300 lb. ..	9	277·1	8·6	32·0	1 Mid. White. 1 Tam. 1 Large White x Mid. White 1 Wessex x Large White 5 Large White
301 lb. to 350 lb. ..	8	331·8	9·5	34·9	2 Berkshire 6 Large White
351 lb. to 400 lb. ..	12	383·2	9·6	39·6	1 Large White x Berkshire 1 Large White x Tam. 1 Tam. 9 Large White
Over 400 lb.	10	428·6	11·0	38·9	1 Berkshire 9 Large White
All Litters	51	318·4	8·9	35·5	

TABLE 2.—CLASSIFICATION OF LITTERS ACCORDING TO NUMBER OF PIGS IN LITTER AT 56 DAYS OLD.

—	Number of Litters.	Average Weight of Litters.	Average Weight per Pig.
		lb.	lb.
Litters of 5 pigs	3	186·3	37·2
„ „ 6 „	3	171·3	28·5
„ „ 7 „	9	233·2	33·3
„ „ 8 „	4	331·2	41·4
„ „ 9 „	10	337·8	37·5
„ „ 10 „	9	350·0	35·0
„ „ 11 „	7	398·2	36·2
„ „ 12 „	6	404·6	33·7
Those litters of less than 9 pigs	19	236·6	35·1
Those litters of 9 or more pigs	32	367·0	35·6

* * *

Book Review

Imperial Bureau of Horticulture and Plantation Crops. Index to Horticultural Abstracts, Volumes I.–X., 1931–40. I.B.H.P.C., East Malling, Kent, England, 1941, pp. 160, 25/-.

At the first Imperial Horticultural Conference held in London in August, 1930, the following resolution was adopted:—"That a commentary on current horticultural literature is desirable, and should take the form of summaries of sufficient length to indicate the contents and scope of the papers concerned."

Horticultural Abstracts was the result, and ever since then this quarterly journal has faithfully recorded in the form of comprehensive abstracts in English the gist of the more important papers on horticultural research wherever and in whatever language they may have appeared.

To ensure efficient service, the continuous examination of a vast assortment of scientific periodicals has been necessary, for the subjects classed as horticultural are many, and wander from the beaten track of straightforward cultivation of commercial fruits and vegetables far into tortuous scientific by-paths in which none but an expert guide can find the way.

Now, after ten years, in which *Horticultural Abstracts* with its yearly index has provided the necessary guidance, the work has been rounded off by the provision of a single, comprehensive subject and author index covering the whole period.

In it the subject-matter of more than 9,500 papers is carefully cross-referenced; how wide their compass a mere glance at the index will reveal.

The inquisitive horticulturist using both index and abstracts in conjunction will here find an efficient summary of information on all modern horticultural problems, together with exact references to original work.

The Fungicides Act

A Review of Registrations for 1942

By W. C. ROBERTSON, Chemist

THE Victorian *Fungicides Act* 1935 (No. 4295) is a law regulating the sale of fungicides, insecticides, vermin and weed destroyers.

A fungicide is any substance used for the purpose of destroying or preventing the attacks of fungi or other parasite plants, or bacteria; and any substance which is by proclamation declared to be a fungicide for the purposes of the Act.

An insecticide is any substance used for the purpose of (*a*) destroying insects or other pests which affect or attack plants, fruits, or animals, or (*b*) preventing such insects or pests from infesting or attacking plants, fruits, or animals; and any substance which is proclaimed an insecticide under the Act.

Vermin destroyer is any substance used for the purpose of destroying rabbits, rodents, dingoes, foxes, or other noxious animals or birds; and any substance proclaimed a vermin destroyer for the purposes of the Act.

Weed destroyer means any substance used for the purpose of destroying or preventing the spread of weeds or noxious plants; and any substance which is proclaimed as a weed destroyer under the Act.

Common examples are copper oxychloride (fungicide), nicotine sulphate (insecticide "*a*"), caustic lime (insecticide "*b*"), arsenious oxide, more commonly called white, or grey arsenic (vermin destroyer), atlacide, which is a mixture of chlorates of sodium and calcium with the respective chlorides (weed destroyer —non-poisonous), and arsenic pentoxide (weed destroyer—poisonous).

Sodium arsenite is extensively used as a timber and scrub killer, but the term "weed destroyer" hardly covers its use for this purpose.

In this article the term "pest destroyer" means any one or all of the foregoing classes.

A country lime works. Lime is used extensively as an insecticide, and in the manufacture of some fungicides.

The main pest destroyers in common use in Victoria are very few in number and are as follow:—

1. Arsenical compounds, with the oxides as the active constituent.
2. Nicotine or nicotine sulphate, with nicotine as the active constituent.
3. Lime-sulphur and sulphur, with sulphur as the active constituent.
4. Copper compounds, with copper as the active constituent.
5. Miscible oils and oil emulsions, with oil as the active constituent.

Of lesser popularity and importance are coal-tar derivatives, organic mercury compounds, and Derris Root and its extract.

For the current year there are approximately 400 pest destroyers registered under the provisions of the Act, 75 per cent. (300) of which consist of the main lines enumerated above, a fact which indicates unnecessary and uneconomical overlapping.

The pest destroyers registered include 81 (20 per cent.) with arsenic oxides as the destroying agents; 34 (9 per cent.) with nicotine the active constituent; 41 (10 per cent.) containing the fungicide copper; 35 (9 per cent.) containing sulphur as the active constituent; and 41 (10 per cent.) of the various oils and their emulsions in which the oil is relied upon as an insecticide or ovicide.

In addition to the foregoing there are 55 (14 per cent.) registrations of dual-purpose dusting powders, which are combinations of two or more of the principal pest destroyers—namely, nicotine, arsenic, copper, and sulphur.

Of these substances all the sulphur used is imported, and the amount of nicotine sulphate manufactured in Victoria or Australia is regulated by the amount of raw material, i.e., tobacco waste available. On the other hand, arsenic and copper are in plentiful supply for the manufacture of pest destroyers.

Pest destroyers manufactured locally from the raw materials enumerated above are of excellent quality and equal to anything the world has to offer.

For the manufacture of home-made or instant Bordeaux mixture, the "snow" or "niege" form of bluestone crystals is the best, in that the small crystals dissolve readily in water to give the operator the ease of manipulation so necessary to produce the high grade mixture.

Basic copper carbonate and Smutol, Soltosan Perinox, and Bunticide (all oxychloride) are extensively used as a dry pickle or dust for wheat, and could be used with good effect in this manner on all seeds prior to storage or sowing.

Lime sulphur solution of standard quality is second only to Bordeaux mixture in its popularity as a fungicide. As temperatures rise the spraying strength must be decreased to avoid "burning." In many cases it is advisable to use colloidal insoluble sulphur when there is any possibility of trouble following the use of the concentrated liquid in which the sulphur is in the soluble form.

Nicotine sulphate is probably the most efficient quick-acting insecticide on the market, and probably is more effective in the form of dusting powder than as a liquid spray.

Mineral oils are now in general use as scale destroyers and ovicides. When used as a dual-purpose spray with lead arsenate the quantity of white spray should be strictly in accordance with the recommendations, because the alkali emulsifier used to emulsify the oil renders the arsenic of lead arsenate more soluble, and this, under certain conditions, has an injurious effect on both tree and fruit.

Blowfly preparations call for little comment except to say that the ideal preparation is one containing an ovicide, a deterrent, a killer and an antiseptic healer. The blend should be water insoluble and possess fixative properties.

A study of the list of blowfly preparations registered provides much interesting matter and should prove valuable to all sheep farmers.

The standard sheep dip (arsenical) proclaimed by the Department of Agriculture is one which, when diluted with water in accordance with the instructions on the label, shall contain not less than ·20 per cent. and not more than ·25 per cent. of arsenic calculated as arsenious oxide (AS_2O_3), and it must not contain any free caustic soda.

The minimum percentage represents the limit for killing efficiency, and the maximum percentage the upper safety limit.

All brands of the standard dip should be of approximate equal strength and quality.

In the miscellaneous section the dips include tar acids and Derris extract. With these substances only as active ingredients, and in combination with arsenic as the principal active constituent.

In addition to the pest destroyers in general use by primary producers, there are some (approximately 25 per cent.) of interest only to the home gardener.

Copies of the registrations under the Fungicides Act for the current year are now available in pamphlet form free of charge, on application to the Chemist, State Laboratories, Gisborne-street, Melbourne, C.2.

Burnley Egg-Laying Competition

Final Results, 1941-42

By H. F. CLINTON, Poultry Expert

Mr. F. W. Becker's team of Australorps. These birds won the wet mash section for their breed with a total of 1,398 first-grade eggs.

THE thirty-first Egg-laying Competition for fowls, conducted at the Burnley School of Primary Agriculture and Horticulture, commenced on 1st April, 1941, and concluded on 2nd March, 1942—a period of 48 weeks.

The competition continues to be well supported by breeders. The whole of the available accommodation was filled, consisting of 70 pens for teams of six birds each, and 236 pens for single birds, making a total of 656 birds entered. This support was most pleasing, and indicates that the value of the competition is appreciated by breeders. The results obtained in the competition have a definite influence in assisting to establish stock of the most desirable quality on commercial poultry farms.

The weather conditions generally throughout the test were favorable for egg production, and the competition was a successful one.

Although at the end of the 48 weeks no bird had laid a sufficient number of eggs to qualify it to be retained for the full twelve months in an attempt to break the present Burnley record, some very good scores were recorded.

The Burnley Competition commenced in the year 1911, and the highest twelve months' record for a team of six birds of any breed since the commencement was established by a team of Australorps entered by the late Mr. J. J. Herbert, in the 1940–41 competition. This team laid 1,812 first-grade eggs. The highest twelve months' record for a single bird of any breed was made by an Australorp, in the same competition, owned by Mr. F. W. Becker, with a total of 340 first-grade eggs.

An outstanding performance in the 48 weeks' test just concluded was that put up by birds owned by Mr. F. W. Becker. This breeder entered birds in five different classes and obtained

first prize in each of three classes, and a second and an equal third prize in two other classes. The highest number of eggs recorded in all classes of Section A, Teams of Six Birds, was established by Mr. A. R. Marshman's team of White Leghorns. These birds were fed on wet mash, and laid 1,436 first-grade eggs. The highest number of eggs recorded in all classes of Section B, Individual Birds, was laid by Mr. E. Wilson's White Leghorn, fed on dry mash, with a total of 305 first-grade eggs.

Approximately 200 visitors attended the poultry farmers' field day at the Burnley Gardens on Saturday afternoon, 25th October, 1941, when the birds entered in the 1941–42 competition were inspected. Short talks were given by officers of the Department of Agriculture, and an exhibition of poultry appliances, records, foods, and eggs was displayed in the pavilion. The day proved to be a most successful and enjoyable one, largely due to the assistance rendered by the National Utility Poultry Breeders Association (Victorian Branch), representatives of poultry organizations, visitors from country districts, and a great number of competitors and supporters of the Burnley Competition.

Keen interest continues to be taken in Rhode Island Reds, and 74 birds of this breed competed this year.

The mortality among the competing birds was 8·1 per cent. During the hot weather in December and January, eleven birds died from heat apoplexy. As it is in the interest of all poultry breeders to improve their flocks and reduce mortality, competitors should exercise special care in the selection of the stock used to produce birds for egg-laying competitions, and breed only from those possessing a high degree of constitutional vigour.

The average number of eggs produced by the fowls compared with averages taken over the

TABLE SHOWING MONTHLY LAYING RETURNS.

Section A.

Month.	Light Breeds.			Heavy Breeds.					
	White Leghorns.			Australorps.			Other Heavy Breeds. (Rhode Island Reds.)		
	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.
April	234	3,002	12·8	138	1,874	13·5	48	527	10·9
May	233	2,120	9·1	138	1,928	13·9	48	628	13·0
June	232	2,084	8·9	137	2,095	15·2	48	720	15·0
July	231	3,466	15·0	137	2,551	18·6	48	625	13·0
August	231	4,825	20·8	137	2,935	21·4	48	874	18·2
September	231	5,210	22·5	137	3,022	22·0	47	1,092	23·2
October	230	5,381	23·3	136	2,798	20·5	47	1,074	22·8
November	230	4,956	21·5	136	2,561	18·8	47	935	19·8
December	228	4,700	20·6	135	2,212	16·3	47	881	18·7
January	228	4,252	18·6	134	2,075	15·4	47	801	17·0
February	228	3,876	17·0	132	1,920	14·5	46	757	16·4

Section B.

Month.	Light Breeds.						Heavy Breeds.					
	White Leghorns.			Other Light Breeds.			Australorps.			Other Heavy Breeds.		
	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.	Average No. of Birds.	Total.	Average.
April	126	2,070	16·4	8	70	8·7	72	1,229	17·0	30	232	7·7
May	126	2,225	17·6	8	80	10·0	72	1,402	19·4	30	368	12·2
June	126	2,003	15·9	8	54	6·7	72	1,376	19·1	30	386	12·8
July	126	2,336	18·5	8	64	8·0	72	1,482	20·6	29	419	14·4
August	126	2,500	19·8	8	134	16·7	72	1,596	22·1	29	585	20·1
September	126	2,773	22·0	8	169	21·1	72	1,521	21·1	29	642	22·1
October	126	2,883	22·8	8	161	20·1	72	1,321	18·3	29	547	18·8
November	126	2,650	21·0	8	137	17·1	72	1,243	17·2	29	706	24·3
December	125	2,556	20·4	8	123	15·3	71	1,202	16·9	29	645	22·2
January	125	2,203	17·6	8	110	13·7	71	1,018	14·3	28	510	18·2
February	125	2,171	17·3	8	88	11·0	71	837	11·7	28	440	15·7

White Leghorn, owned by Mr. E. Wilson. This bird gained first place in the dry mash section for this breed, and also highest score in section "B," with 305 first-grade eggs.

previous six years continues to be highly satisfactory, as may be seen from the following table :—

AVERAGE NUMBER OF EGGS LAID PER BIRD.

Competition (48 Weeks).	First Grade.	Under weight.	Total.
1935–36	176·8	7·8	184·6
1936–37	183·7	4·4	188·1
1937–38	190·3	2·9	193·2
1938–39	190·2	4·9	195·1
1939–40	188·0	3·9	191·9
1940–41	185·7	8·4	194·1
1941–42	188·3	9·5	197·8

In the competition, prize certificates and sashes were awarded for the greatest number of first-grade eggs laid. During the first two months of the competition a first-grade egg must weigh not less than $1\frac{3}{4}$ oz., and thereafter not less than 2 oz.

At Burnley every egg is weighed to one-tenth of an ounce. These records are available for examination by any competitor.

The percentage of first-grade eggs, underweight eggs, mortality, &c., during the past seventeen years is given in the following table :—

SHOWING THE IMPROVEMENT IN PERCENTAGE OF FIRST-GRADE EGGS, 1925–26 TO 1941–42.

Year.	Percentage of First-grade Eggs.	Percentage of Underweight Eggs.	Average Number of Eggs per Bird.	Percentage Mortality.
	%	%	%	%
1925–26* ..	79·8	20·2	206·3	5·4
1926–27 ..	86·0	14·0	202·3	3·9
1927–28 ..	88·4	11·6	197·8	4·2
1928–29 ..	90·8	9·2	199·0	6·7
1929–30 ..	89·9	10·1	187·3	4·3
1930–31 ..	90·3	9·7	193·3	6·4
1931–32 ..	92·6	7·4	195·2	5·1
1932–33 ..	93·6	6·4	189·9	5·5
1933–34 ..	93·5	6·5	185·1	7·7
1934–35 ..	94·7	5·3	186·4	6·4
1935–36 ..	95·8	4·2	184·6	8·9
1936–37 ..	97·6	2·4	188·1	6·1
1937–38 ..	98·5	1·5	193·2	6·6
1938–39 ..	97·5	2·5	195·1	8·6
1939–40 ..	98·0	2·0	191·9	7·6
1940–41 ..	95·7	4·3	194·1	5·8
1941–42 ..	95·2	4·8	197·8	8·1

* The 1925–26 competition was conducted over a period of 52 weeks, all other competitions 48 weeks.

Mr. J. W. Hattwell's Rhode Island Red, which laid 249 first-grade eggs.

This team of Rhode Island Reds owned by Mr. G. Winter, laid 1345 first-grade eggs in the wet mash section.

STATEMENT SHOWING THE NUMBER OF EGGS LAID BY THE VARIOUS BREEDS IN THE COMPETITION, AND THE AVERAGE NUMBER OF EGGS LAID PER BIRD.

Breeds.	Number of Birds After Allowing for Deaths.	Eggs Laid.			Average Number of Eggs Laid per Bird.		
		First Grade.	Under-weight.	Total.	First Grade.	Under-weight.	Total.
LIGHT BREEDS—WET MASH—							
White Leghorns	272	52,387	2,547	54,934	192·6	9·4	202·0
Brown Leghorns	4	610	3	613	152·5	0·7	153·2
Minorcas	2	331	1	332	166·0	0·5	166·5
Anconas	2	245	..	245	122·5	..	122·5
TOTAL LIGHT BREEDS—WET MASH—	280	53,573	2,551	56,124	191·3	9·1	200·4
LIGHT BREEDS—DRY MASH—							
White Leghorns	78	14,553	747	15,300	186·5	9·5	196·0
TOTAL LIGHT BREEDS—WET AND DRY MASH	358	68,126	3,298	71,424	190·3	9·2	199·5
HEAVY BREEDS—WET MASH—							
Australorps	200	37,641	2,455	40,096	188·2	12·2	200·4
Rhode Island Reds	74	13,385	261	13,646	180·8	3·5	184·3
White Wyandottes	2	333	..	333	166·5	..	166·5
Rhode Island Whites	2	284	26	310	142·0	13·0	155·0
TOTAL HEAVY BREEDS	278	51,643	2,742	54,385	185·7	9·9	195·6
TOTAL ALL BREEDS	636	119,769	6,040	125,809	188·3	9·5	197·8

The Awards.

Teams of Six.

In Section A, Class 1, White Leghorns, Wet Mash, Mr. A .R. Marshman won first prize, and also gained a first prize Burnley Champion Sash, with a team that laid 1,436 first-grade eggs, the highest score recorded in Section A. Mr. F. W. Becker, who won first prize in this class in the three previous competitions, was awarded second prize, also a second prize Burnley Sash, with a team that laid 1,423 eggs, while a team entered by M. R. J. Francis was third with 1,284 eggs. A bird in Mr. Becker's team in this class laid 272 first-grade eggs.

In Class 2, White Leghorns, Dry Mash, first prize went to Mr. F. W. Becker, with a team that laid 1,382 first-grade eggs. Mr. Becker obtained first prize in this class in the two previous competitions. A bird in Mr. Becker's winning team in this class laid 263 eggs, all first grade.

In Class 4, Australorps, Mr. F. W. Becker won first prize, and also gained a third prize Burnley Sash, with a team that laid 1,398 first-grade eggs. Mr. W. Weston, who gained second prize in this class last year, was again awarded second prize with a team that laid 1,307 eggs, and a team entered by Mr. J. Wear secured third prize with 1,255 eggs. A bird in this class entered by Mr. J. F. McLean, laid 287 eggs, all first grade, the highest score recorded by an individual bird in all classes of Section A.

In Class 5, Rhode Island Reds, Mr. G. Winter was awarded first prize for a team that laid a total of 1,345 first-grade eggs. Messrs. Fellows Bros. won second prize with a team that laid 1,292 eggs, and Mr. J. W. Hattwell's team obtained third prize with 1,144 eggs. A bird in Mr. Hattwell's team laid 251 eggs, all first grade.

Individual Birds.

In Section B, Class 1, White Leghorns, Wet Mash, first prize was won by Mr. F. W. Becker, and he also gained a second prize Burnley Sash, with a bird that laid 279 first-grade eggs. Mr. A. J. Glanfield's bird obtained second prize, also a third prize Burnley Sash, with a total of 276 eggs, only three eggs behind the first prize bird, while Messrs. C. and D. McLauchlan's entry was a close third with 271 eggs.

In Class 2, White Leghorns, Dry Mash, first prize was won by Mr. E. Wilson, and he was also awarded a first prize Burnley Champion Sash, with a bird that laid a very good score of 305 first-grade eggs—the highest individual score recorded in all classes of both Sections A. and B. Mr. J. R. Maddison, who secured first prize in this class last year, gained second prize with a bird that laid 271 eggs, and Mr. J. F. Bradstreet's entry obtained third prize with 257 eggs.

In Class 4, Australorps, first prize went to Mr. F. Robson with a bird that laid 263 first-grade eggs. Mr. C. E. Graham was awarded second prize with a bird that laid 262 eggs, only one egg behind the first prize bird, while the birds entered by Messrs. F. W. Becker, and A. R. Davey, and the Grenville Stud Poultry Farm, followed closely for equal third prize with a total of 261 eggs each.

In Class 5, Rhode Island Reds, Mr. J. W. Hattwell won first prize with a bird that laid 249 first-grade eggs. Mr. N. D. Underwood, who obtained third prize in this class last year, was awarded second prize with a bird that laid 232 eggs, while Mr. H. L. Chalmers' entry followed closely with 231 eggs.

Cost of Feeding, &c.

There were 656 fowls in the competition at its commencement, but 53 of these died. The total number of days these latter birds collectively were in the pens was 11,076, which is equal to approximately 33 birds having been there for the full 48 weeks. Therefore, the total number of birds in the competition for the whole period may be regarded as 636, and this is the figure used in working out averages, &c.

The different kinds and quantities of the food fed to the birds during the currency of the competition were as follow:—Wheat, 23,927 lb.; hulled oats, 4,996 lb.; cracked maize, 5,202 lb.; bran, 14,721 lb.; pollard, 22,670 lb.; meat-meal, 177 lb.; dried whey, 193 lb.; dried buttermilk, 224 lb.; meat, 3,538 lb.; onions, 225 lb.; grit, 3,900 lb.; salt, 224 lb.; charcoal, 211 lb.

The total number of eggs laid, including those under weight, was 125,809, an average per bird of 197·8 for the 48 weeks.

The price realized for the eggs averaged a fraction under 1s. 3d. per dozen. The market value of the eggs averaged 19s. 9½d. per bird, and the cost of food averaged 8s. 11d. per bird, a fraction under 2¼d. per week; thus the return over cost of food for 48 weeks averaged 10s. 10½d. per bird. The prices received for the eggs, however, are exclusive of freight or commission charges, &c. Also, it must be remembered that the eggs were laid by pullets in their first year of production, kept in single pens or in teams of six, the conditions being entirely different from those on commercial farms where birds of various ages are kept in large flocks.

Prize List—1941-42

SECTION A.—TEAMS OF SIX BIRDS—TRAP-NESTED.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.			
	First Prize—Champion Certificate, also Burnley Champion Sash.			
19	A. R. Marshman, Archies Creek	1,446	10	1,436
	Second Prize—Government Certificate, also Second Prize—Burnley Sash.			
6	F. W. Becker, Follett-road, Cheltenham, S.22	1,425	2	1,423
	Third Prize—Government Certificate.			
7	R. J. Francis, Chandler-road, Noble Park	1,329	45	1,284
	Class 2.—White Leghorns—Dry Mash.			
	First Prize—Champion Certificate.			
31	F. W. Becker, Follett-road, Cheltenham, S.22	1,384	2	1,382
	Class 4.—Australorps—Wet Mash.			
	First Prize—Champion Certificate, also Third Prize—Burnley Sash.			
49	F. W. Becker, Follett-road, Cheltenham, S.22	1,407	9	1,398
	Second Prize—Government Certificate.			
69	W. Weston, 104 Broome-crescent, Wonthaggi	1,341	34	1,307
	Third Prize—Government Certificate.			
67	J. Wear, Werribee ..	1,286	31	1,255
	Class 5.—Rhode Island Reds—Wet Mash.			
	First Prize—Champion Certificate.			
47	G. Winter, Murgheboluc ..	1,361	16	1,345
	Second Prize—Government Certificate.			
41	Fellows Bros., Outhwaite-road, West Heidelberg, N.23	1,305	13	1,292
	Third Prize—Government Certificate.			
43	J. W. Hattwell, 44 Ebden-street, Elsternwick, S.4	1,145	1	1,144

SECTION B.—INDIVIDUAL BIRDS, SINGLE TEST.

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.			
	First Prize—Champion Certificate, also Second Prize—Burnley Sash.			
13	F. W. Becker, Follett-road, Cheltenham, S.22	279	..	279

Section B.—Individual Birds, Single Test—*continued.*

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash—*continued.*			
	Second Prize—Government Certificate, also Third Prize—Burnley Sash.			
38	A. J. Glanfield, 132 Separation-street, Northcote, N.16	278	2	276
	Third Prize—Government Certificate.			
64	C. and D. McLauchlan, 144 Through-road, Burwood, E.13	272	1	271
	Class 2.—White Leghorns—Dry Mash.			
	First Prize—Champion Certificate, also Burnley Champion Sash.			
234	E. Wilson, 17 Stewart-street, Wonthaggi	305	..	305
	Second Prize—Government Certificate.			
226	J. R. Maddison, Red Cliffs P.O.	284	13	271
	Third Prize—Government Certificate.			
211	J. F. Bradstreet, Springvale-road, Tally Ho	257	..	257
	Class 4.—Australorps—Wet Mash.			
	First Prize—Champion Certificate.			
154	F. Robson, 16 Nelson-street, North Wonthaggi	263	..	263
	Second Prize—Government Certificate.			
125	C. E. Graham, Portarlington	262	..	262
	Equal Third Prize—Government Certificate.			
107	F. W. Becker, Follett-road, Cheltenham, S.22	262	1	261
	Equal Third Prize—Government Certificate.			
127	Grenville Stud Poultry Farm, Spring Vale-road, Spring Vale South	266	5	261
	Equal Third Prize—Government Certificate.			
121	A. R. Davey, Edward-street, Greensborough	261	..	261
	Class 5.—Rhode Island Reds—Wet Mash.			
	First Prize—Champion Certificate.			
185	J. W. Hattwell, 44 Ebden-street, Elsternwick, S.4	249	..	249
	Second Prize—Government Certificate.			
196	N. D. Underwood, Arbour-street, Alphington, N.20	232	..	232
	Third Prize—Government Certificate.			
175	H. L. Chalmers, 9 Lefevre-street, Spotswood, W.14	232	1	231

SECTION A.—FOR THE GREATEST NUMBER OF FIRST GRADE EGGS LAID BY INDIVIDUAL BIRDS IN EACH CLASS OF SECTION A.

Pen No.	Name and Address.	Bird No.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.				
	First Prize—Champion Certificate.				
6	F. W. Becker, Follett-road, Cheltenham, S.22	32	273	1	272
	Second Prize—Government Certificate.				
6	F. W. Becker, Follett-road, Cheltenham, S.22	36	272	1	271
	Third Prize—Government Certificate.				
26	J. A. Stewart, Maldon-road, Castlemaine	152	270	1	269
	Class 2.—White Leghorns—Dry Mash.				
	First Prize—Champion Certificate.				
31	F. W. Becker, Follett-road, Cheltenham, S.22	185	263	..	263
	Second Prize—Government Certificate.				
31	F. W. Becker, Follett-road, Cheltenham, S.22	186	237	..	237
	Third Prize—Government Certificate.				
31	F. W. Becker, Follett-road, Cheltenham, S.22	184	234	..	234
	Class 4.—Australorps—Wet Mash.				
	First Prize—Champion Certificate.				
59	J. F. McLean, Follett-road, Cheltenham, S.22	349	287	..	287
	Second Prize—Government Certificate.				
49	F. W. Becker, Follett-road, Cheltenham, S.22	289	262	2	260
	Third Prize—Government Certificate.				
69	W. Weston, 104 Broome-crescent, Wonthaggi	409	256	...	256
	Class 5.—Rhode Island Reds—Wet Mash.				
	First Prize—Champion Certificate.				
43	J. W. Hattwell, 44 Ebden-street, Elsternwick, S.4	253	251	..	251
	Second Prize—Government Certificate.				
47	G. Winter, Murghebuloc	278	243	..	243
	Equal Third Prize—Government Certificate.				
47	G. Winter, Murghebuloc	280	242	..	242
	Equal Third Prize, Government Certificate.				
41	Fellows Bros, Outhwaite-road, West Heidelberg, N.23	243	242	..	242

SECTION A.—FIRST CLASS CERTIFICATES OF MERIT TO TEAMS IN CLASSES 1, 2, AND 4, WHICH LAID 1,200 FIRST GRADE EGGS, AND IN CLASS 5, WHICH LAID 1,000 FIRST GRADE EGGS.

Pen No.	Name and Address.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.	
2	Avonlea Stud Poultry Farm, Silver-street, Cheltenham, S.22	1,257
24	Lenham Poultry Farm, Terang ..	1,254
4	H. L. Chalmers, 9 Lefevre-street, Spotswood, W.14	1,201
	Class 4.—Australorps—Wet Mash.	
53	Grenville Stud Poultry Farm, Spring Vale-road, Spring Vale South	1,250
	Class 5.—Rhode Island Reds—Wet Mash.	
44	J. Robertson, 40 Ardmillan-road, Moonee Ponds, W.4	1,031
45	W. Tedstone, Whitehorse-road, Balwyn, E.8	1,026
42	A. J. Glanfield, 132 Separation-street, Northcote, N.16	1,010
46	N. D. Underwood, Arbour-street, Alphington, N.20	1,010

SECTION A.—FIRST CLASS CERTIFICATES OF MERIT TO INDIVIDUAL BIRDS IN CLASSES 1, 2, AND 4, WHICH LAID 220 FIRST GRADE EGGS, AND IN CLASS 5, WHICH LAID 200 FIRST GRADE EGGS.

Pen No.	Name and Address.	Bird No.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.		
19	A. R. Marshman, Archies Creek ..	114	266
	" " " " ..	110	258
	" " " " ..	109	234
	" " " " ..	111	244
	" " " " ..	112	222
6	F. W. Becker, Follett-road, Cheltenham, S.22	31	263
	" " " "	34	251
7	R. J. Francis, Chandler-road, Noble Park	41	235
	" " " "	42	233
	" " " "	39	225
2	Avonlea Stud Poultry Farm, Silver-street, Cheltenham, S.22	8	236
	" " " "	11	231
24	Lenham Poultry Farm (F. Smith), Terang	139	225
	" " " "	142	225
4	H. L. Chalmers, 9 Lefevre-street, Spotswood, W.14	20	236
	" " " "	21	228
	" " " "	22	226
18	Avonlea Stud Poultry Farm, Silver-street, Cheltenham, S.22	108	237
16	K. McKenzie, Whittington P.O., via Geelong	95	230
20	Molson's W. L. Stud, 188 Blackburn-road, North Blackburn	115	234
3	Dixon Bros, White Hills P.O., via Bendigo	13	223

Section A.—First Class Certificates of Merit—*continued.*

Pen No.	Name and Address.	Bird No.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash—*continued.*		
5	T. J. Crewther, Carlow-street, East Bentleigh, S.E.15	27	224
	,, ,, ,, ,,	30	242
23	Lenham Poultry Farm, Terang ..	138	231
17	K. A. McLaughlin, Central-avenue, Bayswater	100	231
11	J. W. Hattwell, 44 Ebden-street, Elsternwick, S.4	63	242
	Class 2.—White Leghorns—Dry Mash.		
31	F. W. Becker, Follett-road, Cheltenham, S.22	181	223
	,, ,, ,, ,,	182	220
36	Pine View Poultry Farm, 3 Monteath-avenue, Hawthorn East, E.3	212	224
	,, ,, ,, ,,	216	225
37	Lenham Poultry Farm (F. Smith), Terang	222	229
33	Grenville Stud Poultry Farm, Spring Vale-road, Spring Vale South	195	229
	Class 4.—Australorps—Wet Mash.		
49	F. W. Becker, Follett-road, Cheltenham, S.22	290	242
	,, ,, ,, ,,	291	243
	,, ,, ,, ,,	293	240
	,, ,, ,, ,,	294	220
69	W. Weston, 104 Broome-crescent, Wonthaggi	414	221
67	J. Wear, Werribee	400	251
	,, ,, ...	401	223
	,, ,, ...	402	227
53	Grenville Stud Poultry Farm, Spring Vale-road, Spring Vale South	313	250
	,, ,, ,, ,,	314	235
55	C. H. Harvey, Pakenham South ..	327	255
	,, ,, ,, ,,	329	242
	,, ,, ,, ,,	330	221
61	Wimbledon Poultry Farm (J. Mooney), 360 Pascoe Vale-road, Pascoe Vale, W.8	366	240
66	D. and J. Tresise, Durham Poultry Farm, Serpentine ..	393	225
54	M. Hanham, c/o E. Ladson, "Acton," High-street, Beechworth	319	220
	,, ,, ,, ,,	320	233
68	A. E. H. Webb, Frankston-road, Cranbourne	407	229
56	R. N. Jones, 28 Spring-street, Preston, N.18	331	241
70	R. S. Youl, "Wycherley," Wedderburn	417	247
52	F. W. Greenfield, Goodwin-street, Blackburn	307	240
63	W. A. Shevill, 35 Bourke-street, Mentone, S.11	374	226
	Class 5.—Rhode Island Reds—Wet Mash.		
47	G. Winter, Murgheboluc	279	239
	,, ,, ,, ...	281	218
	,, ,, ,, ...	282	211
41	Fellows Bros., Outhwaite-road, West Heidelberg, N.23	241	208
	,, ,, ,, ,,	244	216

Section A.—First Class Certificates of Merit—*continued.*

Pen No.	Name and Address.	Bird No.	First Grade Eggs.
	Class 5.—Rhode Island Reds—Wet Mash—*continued.*		
41	Fellows Bros., Outhwaite-road, West Heidelberg, N.23	245	217
	,, ,, ,, ,,	246	236
43	J. W. Hattwell, 44 Ebden-street, Elsternwick, S.4	255	217
	,, ,, ,, ,,	257	203
44	J. Robertson, 40 Ardmillan-road, Moonee Ponds, W.4	260	207
	,, ,, ,, ,,	262	227
45	W. Tedstone, Whitehorse-road, Balwyn, E.8	265	214

SECTION B.—FIRST CLASS CERTIFICATES OF MERIT TO HENS IN CLASSES 1, 2, AND 4, WHICH LAID 240 FIRST GRADE EGGS, AND IN CLASSES 3 AND 5, WHICH LAID 220 FIRST GRADE EGGS.

Pen No.	Name and Address.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.	
32	A. T. Dent, "Ridgeway," Sellars-street, Greensborough	269
68	J. R. Maddison, Red Cliffs P.O. ..	268
95	G. Turnbull, 103 Locksley-road, Ivanhoe, N.21	268
70	T. A. Mentiplay, Somerville	267
96	G. Turnbull, 103 Locksley-road, Ivanhoe, N.21	266
45	A. Hewett, Central-avenue, Bayswater ..	265
90	T. J. Stevens, 309 Darling-street, Ballarat	265
48	Mrs. H. Howson, McEwan-road, Heidelberg West, N.23	264
41	J. W. Hattwell, 44 Ebden-street, Elsternwick, S.4	260
78	T. A. Pettigrove, 159 Hawdon-street, Heidelberg, N.22	260
6	J. Armstrong, 657 Bell-street, West Preston, N.18	259
43	A. E. Head, 38 Serrell-street, East Malvern, S.E.5	256
29	A. R. Davey, Edward-street, Greensborough	253
91	W. A. Sutherland, 2 Whitmuir-road, Bentleigh, S.E.14	253
7	T. B. Arnott, 122 Gardenvale-road, Gardenvale, S.4	252
60	H. Lyon, 33 Clara-street, Preston, W.18	252
99	A. McIlvain, 24 Harbury-street, Reservoir, N.19	252
61	K. McKenzie, Whittington P.O., via Geelong	251
14	F. W. Becker, Follett-road, Cheltenham, S.22	250
56	C. and K. Langdon, Bullock Swamp, Colac	249
74	F. T. Moore, 152 Nimmo-street, Essendon, W.5	249
28	T. J. Crewther, Carlow-street, East Bentleigh, S.E.15	248
50	A. Johnson, Sunray-avenue, Cheltenham, S.22	246

Section B.—First Class Certificates of Merit—*continued.*

Pen No.	Name and Address.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash—*continued.*	
30	A. R. Davey, Edward-street, Greensborough	245
55	C. and K. Langdon, Bullock Swamp, Colac	243
80	P. Phelan, 11 Traill-street, Northcote, N.16	242
83	W. P. Rowe, Eden Park, Whittlesea ..	241
	Class 2.—White Leghorns—Dry Mash.	
230	A. A. Skinner, 75 Vincent-street, Sandringham, S.8	255
212	J. F. Bradstreet, Spring Vale-road, Tally-Ho	245
220	F. L. Dobbin, 158 Black-street, Bendigo	243
	Class 4.—Australorps—Wet Mash.	
120	T. J. Crewther, Carlow-street, East Bentleigh, S.E.15	257
110	T. Birchall, 180 Harold-street, Thornbury, N.17	256
132	A. E. Head, 38 Serrell-street, East Malvern, S.E.5	256

Section B.—First Class Certificates of Merit—*continued.*

Pen No.	Name and Address.	First Grade Eggs.
	Class 4.—Australorps—Wet Mash—*continued.*	
108	F. W. Becker, Follett-road, Cheltenham, S.22	255
156	N. R. Savory, 170 Prospect Hill-road, Canterbury, E.7	252
147	T. A. Pettigrove, 159 Hawdon-street, Heidelberg, N.22	251
155	N. R. Savory, 170 Prospect Hill-road, Canterbury, E.7	250
133	H. E. Hill, 20 Turner-street, North Wonthaggi	247
	Class 5.—Rhode Island Reds—Wet Mash.	
179	R. R. Christie and Son, Tucker-road, Bentleigh, S.E.14	230
182	C. J. and D. Hardwick, Millbrook, Lower Plenty	221
193	G. Turnbull, 103 Looksley-road Ivanhoe, N.21	221

The White Leghorn entered by E. Wilson, 17 Stewart-street, Wonthaggi, was bred by F. W. Becker.

Accredited Brucellosis-free Herds (Swine).

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen	Horn, L. A.	Leongatha North
Bowran, L. G.	"Glendare," Tallangatta	Longerenong College ..	Dooen
Bright, George H. ..	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Castle, L. H.	Clarinda	Pietsch R. E.	Katyil
Critten, H. S.	Dumbalk	Rintoul, J. T. C. ..	Glengarry ..
Dookie Agricultural College	Dookie	Roy, W. A.	Morrell's Hill, via Boolarra
Doornbusch, John L. ..	"Starpark," Nhill	State Experiment Farm	Rutherglen
Fairchild and Clutterbuck	Tinamba	Sutherland, R. N. ..	Nullawill
Geddes, L. D. ..	Bungaree	Trenery and Soderlund	"Promview", Foster
Harrison, C. T.	"Eastside" Stud, Pomborneit	Trigg, A. J.	Bungaree
		Trigg, N. H.	Bullarook
Hawtin, I. E. & F. ..	"Rossmoyne," Colac.	Tweddle, J. T. ..	"Winlaton," Shepparton
Haywood, Dr. A. R. ..	Hastings	Walch, M. U.	Baring

Licensed Skin Buyers

Sheep Owners Protection Act

Following is a list of persons licensed, under the Sheep Owners Protection Act, to buy raw sheep skins. The licences have effect until the 31st December, 1942:—

Licence No.	Holder of Licence.	Address.
1497	Allan, J. R. ..	19–23 King-st., Melbourne
1549	Angliss, W., and Co.	42 Bourke-st., Melbourne
1511	Archibald Bros. ..	Taverner-st., Beulah
1411	Armstrong, F. ..	56 Cutter-st., Burnley
1491	Austin and Ford	Hopetoun
1499	Aust. Cent. Woolgrowers and Realisation	590–594 Lt. Bourke-st., Melbourne
1436	Banks, C. L. ..	Barkley-st., Ararat
1469	Bannon, W. J. ..	North-western-rd., St. Arnaud
1425	Barrett, H. L. ..	Bond-st., Sale
1459	Bartlett, A. E. ..	Warren-st., Echuca
1567	Bennett, R. A. ..	Yallourn
1443	Bennett, S. C. ..	71 Isabella-st., Geelong West
1538	Berman, D. ..	Cr. Shelley and Broadway sts., Elwood
1408	Biggs, H. A. ..	Korumburra
1524	Black, S. B. P. ..	129 Albert-st., Ballarat
1565	Borthwick and Sons	84 William-st., Melbourne
1427	Bourke, D. ..	89 Cox-st., Hamilton
1480	Brabinder, L. C.	Melville-st., Nurmurkah
1525	Bridges, T. ..	1115 Ligar-st., Ballarat North
1453	Brooks, E. J. ..	Quambatook
1412	Bunn, W. G. ..	Warragul
1421	Burns and McCleave	206 Mair-st., Ballarat
1523	Burrows, A. ..	34 Scoresby-st., Kerang
1481	Burton Stores Pty. Ltd.	Binney-st., Euroa
1431	Butler, E., and Sons	Tallangatta
1513	Byerley, H. M. ..	115 Wright-st., Adelaide, S.A.
1409	Callan, P. J., and Son	6–8 Moorabool-st., Geelong
1416	Canfield, E. ..	Victoria-st., Rochester
1442	Carlile, T. H. ..	Watson-ter., Mt. Gambier, S.A.
1532	Cary, W. A. ..	High-st., Heathcote
1527	Cass, R. ..	Chetwynd
1418	Clark, J. ..	Lonsdale-st., Hamilton
1563	Clarke, J. T. ..	169 Firebrace-st., Horsham
1492	Collins, H. G. ..	Kaniva
1468	Cook, T. J. ..	Black-st., Terang
1451	Cook, W. J. ..	Allansford
1557	Cooke, E. J. ..	McKenzie-st., Murrayville
1529	Cooper, A. S., Pty. Ltd.	87 Lambeth-st., Kensington
1410	Coulstock, K. ..	Welsford-st., Shepparton
1531	Coulstock, T. ..	Allan-st., Kyabram
1534	Crosthwaite, I. S.	Rosebery
1420	Curry, T. ..	Slivermines-rd., St. Arnaud
1422	Dallimore, P. J.	Brooke-st., Camperdown
1494	Davenport, G. C., of Wm. Haughton and Co.	545 Lt. Collins-st., Melbourne
1438	Dimboola Stores	Lochiel-st., Dimboola
1441	Downes, A. J. ..	Dunkeld
1548	Duggan, T. A. ..	Mollison-st., Kyneton
1446	Eales, F. ..	Bell-st., Penshurst
1456	Edgecombe, J. H.	Hannon-st., Sea Lake
1496	Egan, B. F. ..	Henty-st., Portland
1539	Egan, F. H. ..	Avoca
1465	Ellis, C. J. ..	De Boos-st., Euroa
1517	Ellis, J. M. ..	39 Robert-st., Essendon
1554	Erwin, V. P. ..	Natimuk
1423	Evans, C. J. ..	83 French-st., Hamilton
1564	Evans, W. J. ..	Victoria-st., Boort
1450	Ferguson, F. ..	Market Square, Bendigo
1487	Ferris, M. M. ..	Warrnambool
1490	Flanigan, J. ..	Murray-st., Colac
1566	Freeman, W. G.	Elmore
1521	Gadd, M. C. ..	Walwa
1555	Gelbart, J. M. ..	20 Wilson-st., Carlton Nth.
1505	Gordon, C. G. ..	645 Spencer-st., Melbourne
1533	Gorton, C. H. ..	Vickery-st., Alexandra
1464	Greig, J. W. ..	Rowe-st., Ouyen
1545	Hardy, F A ..	Myamyn
1514	Hargreaves, J. R.	Terang-rd., Mortlake
1553	Harper, W. ..	Alberton
1477	Harris, A. J. ..	Bowen-st., Warragul
1507	Harris, L. ..	Lower Main-st., Stawell
1476	Hassall, W. E. ..	King-st., Rainbow
1494	Haughton, Wm., and Co.	545 Lt. Collins-st., Melbourne
1547	Hegerty, W. J. ..	8 Craigmore-st., East Malvern
1417	Hicks, J. T. ..	Goroke
1559	Hill, D. ..	6 Phillip-st., Warracknabeal
1428	Hogan, A. P. ..	Tumbarumba, N.S.W.
1488	Holdsworth, W. ..	Beaufort
1536	Hould, R. J. ..	Byrne-st., Stawell
1506	Howard, E. J. ..	Woods-st., Donald
1463	Howlett, A. E. ..	Robertson-st., Casterton
1440	Hunting, G. W. ..	282 Bambra-rd., Caulfield
1460	Jackson, J., Pty. Ltd.	Main-st., Bairnsdale

LICENSED SKIN BUYERS—*continued.*

Licence No.	Holder of Licence.	Address.
1501	James, D. ..	199 Boundary-rd., Nth. Melbourne
1512	Jobe, C. E. ..	Stawell
1452	Johnson, A. P. ..	Lake Boga
1568	Jones, A. ..	Bombala-st., Delegate, N.S.W.
1475	Jones, E. V. ..	Harrow
1424	Kennon, J., and Son	River-st., Richmond
1445	Kewin, R. F. ..	Wheeler-st., Corryong
1528	Khan, B. ..	Market Square, Bendigo
1484	Kilroy and Story	Heathcote
1461	Lindsay, D. J. ..	Railway-rd., Jeparit
1503	Long, C. J. ..	12 Campbell-st., East Kew
1537	Lynch, M. T. ..	Rushworth-rd., Kyabram West
1562	McClintock, A. E.	Digby
1489	McColl, D. ..	Tatura
1430	McDonald, I. A.	Corryong
1413	McLean, A., and Son	Smythe-st., Benalla
1434	McLennan, D. ..	Dempsey-st., Wycheproof
1560	McLennan, D. J., and Son	Sea Lake
1498	Marshall, G. ..	Edenhope
1558	Moore, D. R. ..	Hamilton-st., Kilmore
1556	Murrell, H. ..	Murray-st., Casterton
1435	Murrells and McNicol	Napier-st., St. Arnaud
1473	Nicklen, A. R. ..	Talbot-rd., Maryborough
1429	Niddrie, L. G. ..	Hamilton
1437	North Western Wool and Skin Co.	Gummow-st., Swan Hill
1444	O'Beirne, J. D. ..	Hamilton-st., Horsham
1495	O'Beirne, J. F. ..	Linton
1526	Oppenheim, W. ..	21 Peel-st. north, Ballarat
1458	Penney and Son	3 Balaclava-st., Ballarat
1462	Perkins, C., Pty. Ltd.	Sturt-st., Mt. Gambier, S.A.
1448	Perkins, C. T. ..	Robertson-st., Naracoorte, S.A.
1519	Perry, A. J. ..	Prince's Highway, Colac West
1535	Pettitt, R. ..	McMahon-st., St. Arnaud
1510	Phillips Co-op. Socy.	Main-st., Minyip
1482	Phillips, T. J. ..	Mologa
1447	Pyramid Co-op. Socy. Ltd.	Kelly-st., Pyramid Hill
1474	Quarrell, C. ..	Cobden
1544	Reason, C. T. ..	Pekin-rd., Maryborough
1419	Rehfisch, H. K., and Co.	223 Main-st., Ballarat
1433	Rice, J. W. ..	20 Doveton-st., Ballarat Nth.
1471	Rice, W. ..	Delegate, N.S.W.
1414	Rich and Gross ..	Brougham-st., Geelong
1478	Robbins, T. ..	Cohuna
1550	Robertson, C. N.	210 Leicester-st., Carlton
1508	Ross and Brewster	1 Lt. Curran-st., Nth. Melbourne
1540	Ross, J. A. ..	Walwa
1502	Rowan, L. M. ..	Minyip
1485	Ruedin, F. ..	Sparrowhawk-rd., Bendigo
1551	Rutter, J. R. ..	3 Johnson-st., Stawell
1479	Russell, R. ..	Colac West
1504	Scott, A. B. ..	Hunter-st., Heywood
1520	Sharrock, C. H. J.	Bessiebelle
1472	Short, I. W. ..	George-st., Hamilton
1493	Sims Cooper (Freezing Works) Pty. Ltd.	499 Lt. Collins-st., Melbourne
1569	Singh, H. ..	Mooroopna
1426	Stanton, J. ..	Nelson-st., Nhill
1515	Stapleton, J. ..	Nar Nar Goon
1530	Stephens, J. ..	Cant-road, Colac
1541	Stone, Geo. ..	Cohuna
1415	Sutton, J. S. (Mrs.)	Beaufort
1542	Taylor, H. G., and Son	Birchip
1449	Teasdale, R. L. ..	High-st., Charlton
1543	Thomas, F. ..	Tintaldra
1522	Venables, C. A. ..	Alberton
1486	Vines, A. A. ..	Robinvale
1518	Voges, A. V. ..	Hamilton
1509	Waddington, E. H. (Mrs.)	Commercial-rd., Yarram
1483	Waring, J. ..	Rippon-rd., Hamilton
1454	Warnock, R. ..	High-st., Yea
1516	Waters, S. H., and Co.	514 Lt. Collins-st., Melbourne
1467	Watson, E. R. ..	Macarthur
1546	Westphalen, W. R.	Yaapeet
1457	Wheaton, C. M. ..	Miram
1466	Wilkinson, G. R.	Wattle-st., Manangatang
1455	Wingfield, E. H. (Mrs.)	Charlton
1439	Wood, H. L. ..	Balmoral
1470	Wright, N. A. ..	High-st., Shepparton
1552	Young's Blue Store	Birchip
1432	Young, H. ..	Orford
1561	Zed, J. A. ..	14 Bertha-st., Mt. Gambier, S.A.

Contents.

MAY, 1942

		PAGE
Flax Production in Victoria	*W. J. B. McDonald, B.Agr.Sc.*	217
Certified Pullorum-free Flocks		221
Wheat Varieties in the Wimmera		222
Pigs for the War Effort	*L. A. Downey, H.D.A.*	225
Brucellosis-free Herds (Swine)		227
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	228
Wheat and Barley Prices for Poultry and Pigs		232
Dingee Irrigated Pasture Competition	*H. Hanslow*	233
"Tatura Dwarf Globe"—A New Tomato Variety	*F. A. Maher, B.Agr.Sc.*	241
Fodder Conservation Competition at Benalla	*W. D. Andrew, M.Agr.Sc.*	245
Rabbit Skins—Skinning, Stretching, Storing	*A. C. T. Hewitt, M.Agr.Sc.*	251
Potato Seed Certification	*J. T. Ramsay*	254
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	257
Garden Notes	*J. L. Provan, B.Agr.Sc.*	258
Ascochyta Blight of Field and Garden Peas	*L. L. Stubbs, B.Agr.Sc.*	260
Registration of Stallions—Twenty-second Annual Report	*R. J. de C. Talbot, B.V.Sc.*	263
"All Time" Standard Herd Test Record		266
Soft Curd Autumn Milk	*A. C. E. Smith, B.Agr.Sc.*	267
Advantages of De-horning Cattle		270
Tubercle-free Herds		271

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

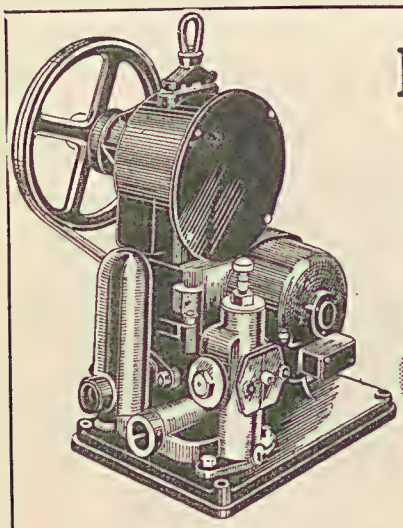
COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.



"RIVERSIDE" SELF-OILING DOUBLE-ACTING VERTICAL PISTON PUMP.

Motor Driven.

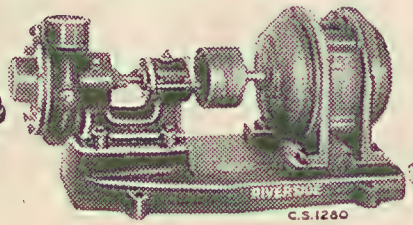
The ideal domestic water supply pump; delivers 250 gallons per hour to a total height of 100 feet when driven by ½ h.p. electric motor. Also obtainable with petrol engine drive.

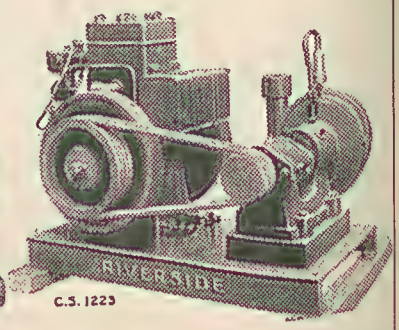
Phone MX 2251.

PUMPS - ALL TYPES

Bring your proposition to us and receive the benefits of our Technical Service

Make your next selection a "RIVERSIDE" Its a safe investment





"RIVERSIDE" ball bearing direct coupled Electric Motor and Engine driven Pumping sets are available for all duties.

PRICES and DETAILS with LITERATURE on REQUEST.

CAMERON & SUTHERLAND Pty. Ltd.

RIVERSIDE AVENUE, MELBOURNE, S.C. 4.

INDEX TO ADVERTISEMENTS

FRONT SECTION

Cameron & Sutherland Pty. Ltd. ii
Cooper Engineering Co. Pty. Ltd. ... opp. p. 227
Davis Gelatine Pty Ltd. iv
Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi
H. V. McKay Massey Harris Pty. Ltd. ... iii
International Harvester Coy. of Australia Pty. Ltd. v
Law Somner Pty. Ltd. (Seeds) ... opp. p. 226
Leggo, Victor, & Farmers Ltd. .. inside cover
Lysaght Bros. & Co. Pty. Ltd. iv

BACK SECTION

Ajax Insurance Company Ltd. ... outside cover
Australian Cement Ltd. ... .. inside cover

BACK SECTION—*continued.*

Cockbill, J. viii
Jeyes Fluid viii
Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) vi
Nightingale, A. G. & Co. (Nursery Stock for sale) x
Rylands Bros. (Aust.) Pty. Ltd. viii
State Savings Bank ix
Trewhella Bros. Pty. Ltd. x
Vacuum Oil Co. Pty. Ltd. ... opp. p. 262
Victorian Railways x
W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ix
Yorkshire Insurance Co. Ltd. ... opp. p. 263

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Journal of Agriculture, Victoria—May, 1942.

Flax Production in Victoria

By W. J. B. McDONALD, B.Agr.Sc., Senior Plant Investigation Officer

IN 1939, Australia produced 2,000 acres of flax, all of which was grown in Victoria. In 1940, Commonwealth production was 20,000 acres, of which Victoria grew 12,000, while in 1941 Commonwealth production had grown to 56,000 acres and Victorian production to over 26,000 acres. In 1942 it is expected that Commonwealth production will be over 60,000 acres, of which Victoria will grow 28,000 acres, the remaining 32,000 acres being divided between Tasmania, South Australia, and West Australia.

Practically the whole of the fibre produced here is used for military purposes. The greatest proportion of it is sent direct to the British War Office, while that retained in Australia is devoted to meeting requirements of our own armed forces. If trade routes with India are cut no fibre of any sort other than that produced here will be available to Australian industry. At the time of writing some shipments of jute can still be obtained.

The management of the tremendous extension of flax acreage that occurred between 1939 and 1941 was based mainly on information obtained by this Department from experimental work initiated in 1936.

The basic technique of handling a flax crop was well described by Mr. A. A. Lee (an officer of this Department seconded to the Flax Production Committee for the period of the war) in the pamphlets "Sowing Flax for Fibre" and "Harvesting Fibre Flax," published by this Department in 1940.

Since that period, however, a good deal of additional information has been collated by officers who have been intimately associated with the crop, both as agricultural advisers and crop valuers, and the purpose of this discussion is to draw attention to some of these features, the practical application of which will lead to a general refinement of the art of growing flax. As in all agricultural pursuits, the flax grower who is really efficient is an artist at his job.

Climate and Soil.

Rainfall is the most important factor limiting the areas in which flax can be produced. Both the total amount and nature of the rainfall have an intimate bearing on the success or otherwise of the crop. As a general rule, flax should be confined to districts with an annual fall of 25 inches or better, although a slightly lower total is acceptable if good falls in September, October, and November are a normal expectation. In districts such as the North-east and the Central Highlands where winter temperatures are so low as practically to suppress winter growth, a favourable spring is vitally necessary.

Flax will thrive over a wide range of soils but seems to do best on fertile loams or clay loams. Sands, light sandy loams, or ill-drained clays or waterlogged soils should be avoided.

Soils which are very fluffy or open on the surface, allowing rapid loss of moisture, are not desirable. Many of the chocolate potato soils

An excellent crop of Concurrent flax on the property of Mr. A. Murray, Langley. This crop cut three and a quarter tons to the acre.

are rather suspect in this direction, partly because after the potato crop has been dug, soils are not sufficiently well compacted before planting. Broadly speaking, flax has not been a pronounced success after potatoes.

In any discussion on soil, its weed growing propensities cannot be overlooked. Flax will not compete with vigorous growing weeds, and even if the weeds themselves are not sufficient to suppress the flax, the presence of rubbish in the cut sheaf seriously depreciates the value of the crop. Every farmer worthy of the name knows whether his paddocks can be described as "clean," and it is very important that flax production be confined to clean ground. Irrespective of how well suited to flax a field may be in other respects, it should not be planted to this crop if it is known to produce a heavy crop of weeds in the spring or early summer.

At the present time there are ten flax mills and six flax deseeding depots scattered throughout Victoria. In locating these establishments climatic and soil features have been considered carefully. If the soil on your farm conforms to the above requirements its proximity or otherwise to a flax mill or depot serves as a good guide to its suitability for flax production.

Soil Preparation.

Time and again fallowing has proved its worth to Victorian agriculture. The flax crop is furnishing additional evidence of the value of fallow. In the wetter districts a short term fallow will, in many cases, suffice; in the drier districts fallowing during the preceding spring or early summer is expected to pay big dividends.

The main circumstance in which fallow loses some of its significance is where flax is planted on clover ley. In the season just past, excellent crops have been produced where flax has been planted on clover land turned over neatly with a mouldboard plow, but even in these cases four to six weeks should elapse between plowing and sowing, especially if peamites are known to be present in the clover. Peamites seriously damage a young flax crop and should be destroyed by early plowing.

Flax likes a firm shallow seed bed with a rather fine soil covering, and every stroke of

A crop of Liral Crown flax in the Benalla district.

the cultivator designed to bring the soil condition closer to the perfect tilth will more than pay for itself in better crop returns.

The flax seed is a relatively small seed and likes a fairly fine soil covering. At the same time the young seedling is very tender and will not push through a badly crusted surface layer, so that, in soils which are liable to "skin-over" after rain, care should be taken so as not to leave the surface layer in an extremely fine powdery condition. In these soils a fine crumb structure is the perfect tilth.

Seeding.

There is abundant evidence to show that reasonably early seeding pays in Victoria. Over the bulk of the State seeding should take place between mid-May and mid-June. In some years sowing as late as August will give good crops, but on the average early seeding pays best. Prior to 1941 it was believed that an early sowing on many of our better soil types would carry a heavy risk of the flax lodging in late spring. In the season just past many heavy crops lodged and stood up again three or four times, but at harvest time it is considered that not half of 1 per cent. of crops were lost through this feature. While some risk in this direction cannot be entirely discounted, it is believed that over the bulk of the State the advantages of earliness far outweigh the disadvantages.

In districts such as Berwick and Central Gippsland, where a long period of soft spring weather is a reasonable expectation, early sowing is not so important, and in some years may be a disadvantage.

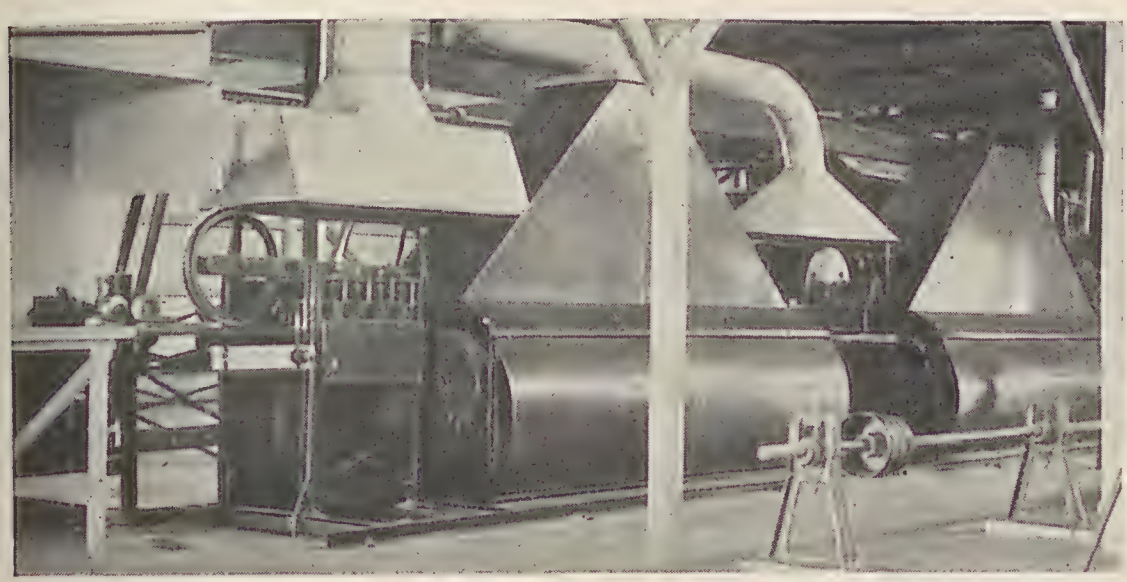
Flax normally is sown at the rate of 70 lb. per acre through the fine side of the cups on the normal grain drill. Usually the drill settings to give this seeding rate are the same as those which will sow from 48 to 60 lb. of wheat, but as individual drills vary, each farmer must check his own drill. As the drill itself sometimes varies from day to day or even in the same day when sowing flax, a constant check should be kept on its delivery rate.

It is hoped that all of the seed sent out this year will be pickled before despatch. As the pickling dust may cause the cups to stick when the drill is idle overnight, all growers should free the cups by turning them with the handle provided for the purpose before commencing operations in the morning.

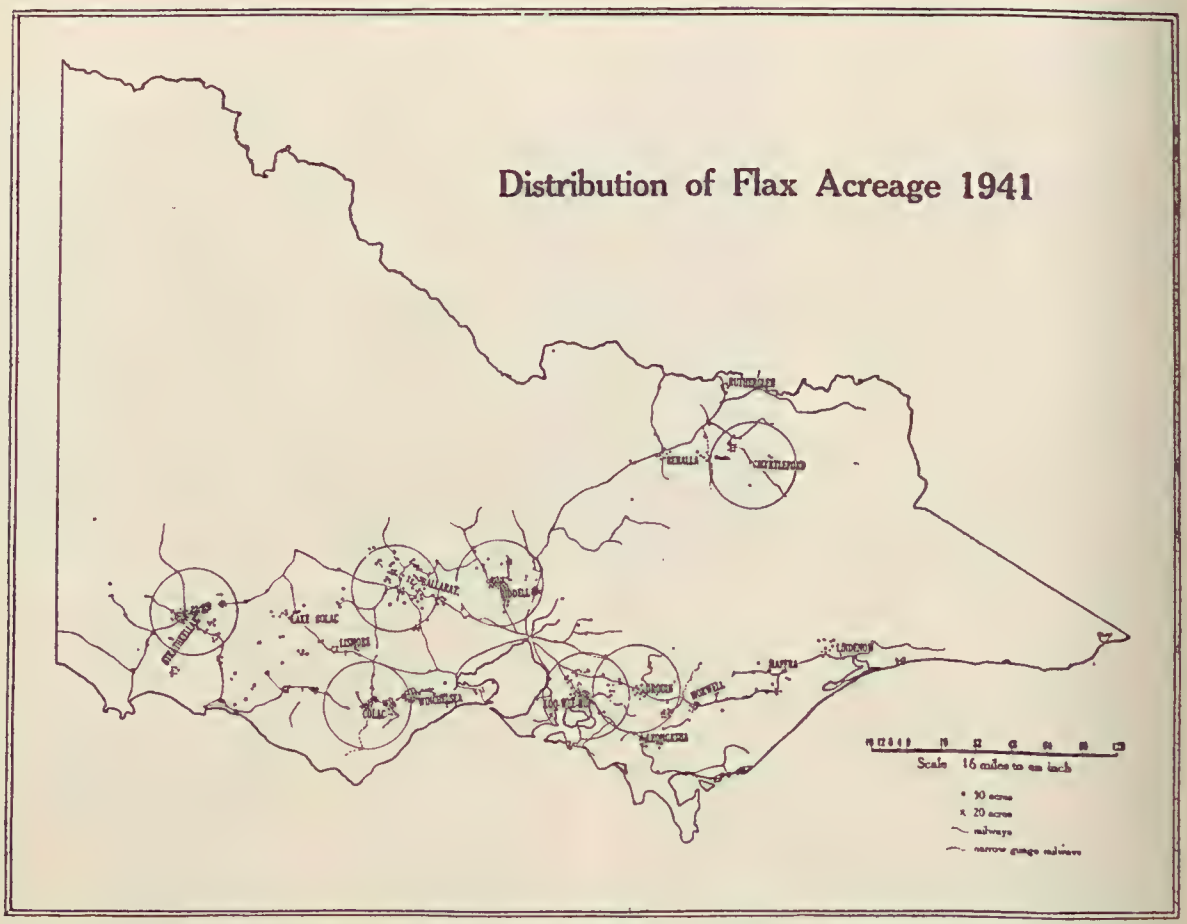
Experiments have shown that shallow seeding is more profitable than deep seeding, and every care should be taken to see that the seed is lodged just under the surface.

Theoretically, the ideal distribution of seed should be obtained by broadcasting. The drill can be made to do this very well by pulling the hoses out of the boots and allowing the mixture of seed and manure to fall on the ground behind the drill.

Experiments have shown that the results obtained from broadcasting and shallow drilling



A scutching machine, Ballarat flax mill.



The plan shows distribution of flax acreage in Victoria for 1941. Each dot represents 50 acres.

are very comparable. The writer prefers the shallow drill, but there is a substantial body of reputable opinion that favours broadcasting.

As far as possible flax should be drilled round and round the paddock so that the binder, when cutting, is always following the drill row. In a thick crop much time is lost and trouble encountered in cutting a double sown headland. It is recommended that double sowing of areas be avoided as far as possible. If necessary, the open loops left by the drill at the corners can be sown by hand. A great deal of time is lost at harvest in opening up and making the back-cuts when the flax is sown right up to the fence. It is suggested that a strip of oats or other cereals be planted around the flax crop so as to give the binder an easy crop on which to make the opening cut.

The roller is a very simple implement that can play an important role in producing a good flax crop.

Previous recommendations have suggested that flax should be rolled after seeding. Observation in the field suggests that this is not always the best practice. If the ground is firm, with a fine mulch, the roller can be discarded temporarily. If the ground is very loose it can be rolled both before and after seeding, but as a general rule it is felt that rolling before sowing is safer than rolling after sowing.

Rolling when the crop is 4 to 6 in. high does not damage the crop, but rather tends to improve it, and it is believed that a rolling at this stage could be applied with profit over a great deal of the flax area. In loose soils this rolling tends to further compact them, and in soils which have crusted over, the rolling tends to break the surface crust with advantage to the flax plant. If rolling after the crop is up, do not start early in the morning when the plant is turgid and brittle, but rather wait until afternoon when the plant is tough and pliable.

Weeds.

It has been stressed previously that a heavy growth of rubbish seriously depreciates the flax crop. Last season several growers turned a flock of sheep on to their flax crops to clean up grass and rubbish growing between the drill rows. This practice seems to have been very successful and probably could be much more widely applied.

The sheep does not find flax very palatable, and avoids grazing it while there is other material to nibble at. If sheep are turned into flax this should be done when the crop is about 6 inches high, and the sheep should not be left there any longer than is necessary to clean up the rubbish. They should not be allowed to get sufficiently hungry to force them into nibbling the flax, as, apart from the fact that the flax would be destroyed, there would be a danger of stomach trouble with the flock. Any flock turned on to a flax crop should be carefully watched. If the flock cannot be shepherded, it is wise to leave them out of the flax crop.

Rotation.

No discussion of flax is complete without reference to the frequency with which it can be sown on the same ground, or without some reference to its demands on soil fertility.

In overseas countries it is an accepted principle that flax should not be planted on the same area more often than once in four years—not because it is an exhausting crop as far as soil fertility is concerned, but because the frequent planting of flax in the same field gives a disease known as flax wilt a chance to develop into serious proportions. By spreading the occurrences of flax on the same area over a period of years the disease is kept in check. This tendency to develop flax wilt if numerous crops of flax are grown in succession has given rise to the entirely false impression that flax is an exhausting crop, because a wilted crop looks to the superficial observer like a poverty stricken crop.

In 1941, many of the best oat crops ever harvested in the Riddell district followed immediately after a flax crop.

In Victoria there is evidence in the Drouin district to show that if flax be grown more often than twice in successive years, flax wilt can develop, but there are also very many instances to show that in soil where flax has not been grown previously it is reasonably safe to take off two crops in succession.

It is good farm management, however, to so plan your cropping programme that flax occurs on the same paddock only once in every four years.

Certified Pullorum-free Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Number.	Owner.	Date of Certification.	Number of Birds.
1	Reformatory Prison, Castlemaine	6th March, 1942 ..	200
2	"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26th March, 1942 ..	927
3	Stewart, J. A., Castlemaine	22nd April, 1942 ..	592
4	Rushton's Electric Hatcheries (J. Rushton), Shepparton	28th April, 1942 ..	653

Wheat Varieties in the Wimmera

Results on Black Land.

WHEAT variety trials on black land are conducted by the Department of Agriculture at several centres in the Wimmera. The main trials are located at the Longerenong Agricultural College in the central Wimmera, and subsidiary tests are conducted in the western Wimmera at Salisbury (near Nhill) and Kaniva, and in the eastern section of the district at Donald.

Over the Wimmera as a whole a good season was experienced. The rainfall at most centres had been favourably distributed throughout the growing period (June to November), and generally was above average in amount. Although the plots at a number of stations, in common with many Wimmera crops, had been affected to some extent by rust, moderate to good yields were obtained.

The results of the main variety trials at Longerenong in the past season, together with the average yields, are shown in the following table.

TABLE 1.—WHEAT VARIETY TRIAL—LONGERENONG.

Variety.	1941.	Average 3 Years, 1939–41.	Average 6 Years, 1936–41.
	bus./ac.	bus./ac.	bus./ac.
Wannon x Ghurka ..	27·1	35·8	38·8
Ghurka x White Fife L.5266	25·5	35·9	..
Ghurka x C.M.G. W.5537	24·8	34·5	..
Quadrat	26·6	34·3	38·4
Baldmin	26·6	34·6	37·2
Magnet	30·8	33·8	36·8
Major x Ranee ..	26·2	33·5	36·4
Ghurka	23·8	32·1	35·3
Regalia	25·8	32·6	..
Pindar	24·0	32·2	..
Bencubbin	23·6	30·0	..
Dundee	24·1	29·6	33·6

It will be noted that over the six-year period at Longerenong, Quadrat has returned the highest yield of the standard varieties, outyielding Ghurka by an average of 3·1 bushels per acre. Quadrat, which was produced by the Department of Agriculture and released for the Wimmera in 1940, closely resembles the

parent variety Ghurka. It possesses all the desirable harvesting features of that wheat, is slightly taller, and is equally resistant to disease.

Baldmin and Magnet also have done well in the Longerenong tests. Baldmin, a fairly early maturing white-chaffed wheat of medium-strong flour quality, is suitable for limited sowing on Wimmera soils. Magnet, on the other hand, is a tall-strawed late maturing variety. As well as being a prolific grain yielder, it is a useful wheat for hay purposes.

The early maturing varieties Regalia, Bencubbin, and Pindar have not been prominent in the tests on black land, but have done relatively better on the red and mixed Wimmera soils.

Of the new crossbred wheats under test, Wannon x Ghurka and Ghurka x White Fife have given very promising results at Longerenong. The latter is one of the new crossbreds specially bred for good flour quality. As these wheats have been tested for only a short period in general district trials, further evidence of their yielding ability and other characters is required.

TABLE 2.—WHEAT VARIETY TRIALS—SALISBURY.

Variety.	1941.	Average 2 Years, 1940–41.	Average 5 Years, 1937–41.
	bus./ac.	bus./ac.	bus./ac.
Ghurka x C.M.G. W.5537	37·3	33·0	..
Quadrat	36·5	32·2	36·7
Magnet	33·2	30·6	34·3
Ghurka	35·0	30·6	34·0
Baldmin	31·3	29·4	32·9
Major x Ranee ..	36·1	30·2	..
Wannon x Ghurka ..	30·8	28·9	..
Pindar	33·6	28·8	32·5
Ghurka x White Fife L.5266	31·2	28·3	..
Bencubbin	30·8	28·6	..
Dundee	29·8	28·2	30·9
Regalia	29·4	27·4	..

The results of the Salisbury tests conducted on the property of Mr. E. W. Dahlenburg, shown in Table 2, support, in general, those obtained at Longerenong, the average yield of Quadrat over the five-year period being 2·7 bushels per acre greater than that of Ghurka. Magnet has returned a slightly higher average yield than Ghurka at Salisbury, while Baldmin has not been so prominent at this centre. The rust was unusually severe at Salisbury last season, and the leading named varieties, Quadrat and Ghurka, demonstrated their comparative resistance to this disease in comparison with the other varieties in the test.

At Kaniva a variety trial has been conducted on the farm of Messrs. Crouch Bros. for one year only, and, while results over a period of years are necessary before definite recommendations can be made, it is of interest that Quadrat was the leading named variety at this centre in the past season. The highest yielding wheat was the crossbred Ghurka x White Fife, which gave 46·0 bushels per acre. The other yields were as follow:—Quadrat 42·2, Wannon x Ghurka, 41·9, Magnet 40·8, and Ghurka 39·8 bushels per acre.

In the tests at Donald in the eastern Wimmera, on the property of Mr. H. O. S. Hancock, two years' results on black land are available, the plots being previously located on red soil. Over the two-year period the early maturing types Ranee 4H and Major x Ranee gave the highest average returns; several other wheats, however, yielded almost as well as these varieties. In view of the abnormal seasons included in this period, further trials will be necessary over a period of years before definite conclusions can be drawn from the figures. In the light of the experience at other centres, it would appear that the later maturing wheats, Quadrat and Ghurka, would be more suited to this class of land in more normal seasons.

Tests on Red Land.

Wheat variety trials on red and chocolate Wimmera land have been conducted by the Department of Agriculture at Warrackuabeal on the property of Mr. W. Altmann (red loam), at Salisbury (near Nhill), on Mr. E. W. Dahlenburg's farm (sandy loam), and at Charlton on chocolate loam on the farm of Mr. W. O'Connor. Sixteen varieties, including eleven standard wheats and five new crossbreds, were tested in replicated trials at these centres during the past year.

At Warracknabeal and Charlton a favourable season had been experienced in 1941, and very good yields were obtained. At Salisbury, however, yields on red land were very light, the plots having been seriously checked by dry conditions during August and later damaged by rust.

The results of the trials at these centres are summarized in the table on the following page, together with the average yields from Donald in 1937-39, when the trials were conducted on red land in this district.

The most prominent variety in these tests has been the crossbred Ghurka x C.M.G. W.5537. In addition to returning the highest yield at both Warracknabeal and Charlton last season, this crossbred was the leading wheat in the two years in which it was tested on red land at Donald. Ghurka x C.M.G.5537 is a brown-chaffed midseason type, its breeding and field characteristics being very similar to Quadrat.

Of the named varieties Quadrat, Baldmin, and Bencubbin have given the best results in the red land tests. The new wheat Quadrat, which was released and distributed in the Wimmera in 1940, has proved superior to the parent variety Ghurka in all the Wimmera trials, and is recommended as a suitable variety for sowing on Wimmera soils.

Baldmin, an early to mid-season type, and the early variety Bencubbin, have given relatively better results in tests on red soils than on black land in the Wimmera. Both these varieties, however, tend to be weak in the straw, and for safety require to be harvested promptly after maturity.

The new crossbred wheats under test include, in addition to Ghurka x C.M.G. W.5537, two varieties which have given very promising results, namely, Wannon x Ghurka and Ghurka x White Fife. The latter has particularly high flour quality and may prove to be very useful for blending purposes. As these wheats have been tested for only a relatively short period in general district trials, further evidence of their yielding ability and other characters is required before they can be recommended for distribution.

Typical heads of the new Wimmera wheat, Quadrat.

The recommendations for varieties for both black land and red land in the Wimmera may be summarized as follows:—

—	General Sowing.	Limited Sowing.
Wimmera black land.. ..	Ghurka Quadrat	Magnet Baldmin
Wimmera red land	Ghurka	Ranee 4H Quadrat Magnet Dundee Baldmin Bencubbin

WHEAT VARIETY TRIALS—RED LAND.

Variety.	Warracknabeal.		Salisbury.	Charlton.		Donald.	
	1941.	Average Two Years, 1940–41.	Average Two Years, 1940–41.	1941.	Average Two Years, 1940–41.	Average Two Years, 1938–39.	Average Three Years, 1937–39.
Ghurka x C.M.G. W.5537 ..	33·9	21·7	..	48·8	25·2	26·8	..
Quadrat	32·1	20·6	20·4	48·5	25·3	25·2	..
Baldmin	34·5	20·3	19·7	47·5	26·2	24·2	28·4
Bencubbin	32·2	19·2	19·8	44·7	25·4	26·1	..
Magnet	31·0	18·4	20·2	43·5	21·3	25·3	30·6
Pindar	31·2	19·6	18·8	42·1	23·2	23·5	..
Ghurka	30·6	19·1	17·8	44·1	23·6	24·7	28·6
Ghurka x White Fife L.5266 ..	31·7	18·8	..	46·1	..	..	..
Wannon x Ghurka	31·2	19·0	..	44·6	..	..	..
Dundee	29·7	18·6	17·8	42·5	22·8	25·2	30·5
Regalia	31·7	18·4	16·8	43·3	24·6	24·6	27·0
Ranee 4H	29·5	17·6	16·5	38·6	23·0	25·3	28·4
Bobin	28·8	..	..	..	..	..	..

Pigs for the War Effort

— Another Call to Farmers —

By L. A. DOWNEY, H.D.A., Pig Expert

Big Increase Required.

SINCE Australia's peak production of pigs was reached about the end of the year 1940, there has been a large reduction in pig breeding for the reasons that the relationship of grain prices and pig prices was unfavorable to pig production, market eruptions caused a loss of confidence in the pig industry, farm labour was reduced, and milk was available in lesser quantities for pig feeding.

Now, pig raisers are asked to increase the production of baconer pigs to the fullest extent of their resources, so as not only to retrieve the reduction of pig breeding, which amounted to about 35 per cent. during the last twelve months, but to achieve an even higher level of production than was reached in the year 1940-41, so that increased requirements caused through changing war conditions may be met.

Security for Pig Raisers.

Farmers generally respond to any national call for the production of certain commodities, but as individuals they have a strong desire for financial security, and so, now that the nation is calling on them for increased production of baconer pigs under difficult conditions, they will feel gratified by a recent statement of the Minister for Commerce. Referring to a feeling within the industry that if producers accepted the invitation to increase production in order to meet present demands, there was no certainty or guarantee that they would be able to dispose of their product at satisfactory prices, the **Minister said he had discussed the matter with the Commonwealth Government, and could undertake that in the event of any difficulty being experienced by producers in finding suitable outlets for their produce, the Government would take the necessary steps to ensure that a payable price was ultimately returned to the producer.**

The greatest demand is for baconer pigs to supply piece bacon and ham and canned rashers of bacon and ham to Australian and Allied Fighting Services within Australia, and to supply the bacon demands of the civil population. Canned pork sausages are also required in large quantities for the fighting services. There is the usual demand for fresh pork for civilian use, and the Commonwealth Government has

undertaken to purchase any surplus pig meats over the above-mentioned requirements, which are suitable for export to the United Kingdom in frozen form.

Pig Prices.

The recent high prices of pigs, which averaged nearly 8d. per lb. for baconers and porkers during February and March, 1942, were due to the short supply available. As production increases these prices might be expected to recede to levels within the reach of the bacon and ham canning trade, which sells on contract to the Canning Committee for supply to the Services. These prices, as recently stated by the Minister of Commerce, should return pig raisers not less than 6½d. per lb. delivered at works for first quality baconer pigs, and 5½d. per lb. for chopper pigs bought for sausage making. The prices at which the Commonwealth Government has undertaken to purchase any surplus exportable frozen pig meats should realize the pig producer approximately 5½d. per lb. delivered at works. While this latter price provides a bottom to the pig market, and adds weight to the Minister's assurance of security, it is most unlikely, in view of the present known requirements, that any exportable surplus of frozen pig meats will be available in Victoria for the next two years. Never before have Australian pig producers had such assurance of markets.

Grain for Pig Feeding.

Prices of pigs are meaningless when they are not considered in relation to the availability and costs of pig foods. In Victoria, most pigs are raised on dairy farms where milk by-products form the base of their diet, and any increase in pig production is largely dependent on the purchase of cereal grains from other districts. This is a weakness in the pig industry, as it involves the cost of handling and transport of grain from one district to another. Up to 15 bushels of grain may be used in the production of a bacon pig, thus handling and transport costs at 6d. per bushel would represent a considerable cost per pig. Such waste should be avoided by growing the food and the pigs on the same farm wherever practicable.

Grain farmers who feed a portion of their grain to pigs may have sufficient milk, or may have to purchase other protein and mineral supplements such as meatmeal and lime to balance the grain in the pigs' diet, but the grain could comprise 90 per cent. of the diet.

Pig raisers who have milk, but are unable to grow grain for their pigs, should purchase and use grain carefully in order to keep down their pork production costs.

At present there are ample supplies of feed barley, and the relationship of pig prices to barley prices is favorable to pig production.

To assist pig raisers to purchase economically, the Australian Barley Board, 483 Collins-street, Melbourne, has agreed to sell direct to pig raisers in lots small enough for them to handle. Lots of 50 bags, or 11 or 16 ton truck-loads, may be purchased direct from the Board at the prices quoted in the daily papers at loading stations. When barley is loaded by the Board from its Melbourne stores, prices are 3d. per bushel higher. Lots of less than 50 bags will be supplied at 2d. per bushel higher than 50 bag or truck lots. On present prices pig raisers in most parts of Victoria should be able to land feed barley at their home stations for less than 3s. per bushel.

The Commonwealth Government has recently arranged for the reduction of 6d. per bushel in the price of feed wheat sold by the Australian Wheat Board, to encourage its use for stock feeding.

Action.

Pig raisers have sufficient foundation stock and plant to bring about a substantial increase in the production of pig meats now that the pig and grain price ratio is favorable.

The progeny of new sows put to breeding now will not be ready for slaughter as baconers for ten months, but an earlier increase in bacon production can be obtained by carrying pigs to heavier weights than those at which they are usually sold. This should be the first step taken by pig raisers. There is a good demand for pigs up to 160 lb. dressed weight, provided they are not excessively fat.

When the object is to make the maximum use of grain to produce the maximum quantity of pig meat, as little as half a gallon of separated milk or ¼ lb. of meatmeal per pig daily may be fed with as much grain as the pigs will eat, provided water and pasture or green food are available, and some lime is added to the ration.

Although full feeding is generally good practice, it has a tendency to fatten pigs at a lighter weight than when they are fed a limited ration. Therefore, some limitation of feeding should

be practised when pigs are being carried to heavier weights than usual, to prevent them being too fat when finished.

A good plan to follow in the case of big bacon type pigs is to feed half a gallon of separated milk, or ¼ lb. of meatmeal, and as much grain as the pigs will eat until they are consuming 6 lb. of grain per head daily, and then keep them on that quantity of food, thus reducing their rate of growth until they are marketed.

In the case of the more compact porker type pigs, it would be necessary to limit the grain allowance to a maximum of 5 lb. per head daily.

When a surplus of separated milk is available, each gallon may be used to replace 1 lb. of grain.

The problem of producing heavier, yet lean, pigs without excessive fat can also be solved by using the larger and longer-bodied type of breeding stock. Pig raisers putting new stock into their herds are advised to select long-bodied, big-framed pigs.

When pigs are hand fed two or three times daily, it is recommended that both barley and wheat should be crushed or coarsely ground before being fed to the pigs, but when self-feeders are used it does not pay to crush or grind wheat, but it does pay to crush or grind self-fed barley.

From 5 to 10 per cent. of meatmeal can be mixed satisfactorily with whole wheat in a self-feeder.

Self-feeders save some labour in feeding, and save crushing or grinding wheat, and are, therefore, worthy of use when it is desired to full feed grain, and particularly when labour is scarce.

The Department of Agriculture will help.

The Department of Agriculture is prepared to help pig raisers by giving them the best available information on feeding, breeding, and health problems with their pigs through personal advice from its officers, by letter, and by supplying free of charge pamphlets on the several phases of pig raising. Farmers are urged to make full use of these services to ensure maximum pig production with minimum waste.

Accredited Brucellosis-free Herds (Swine).

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen	Horn, L. A.	Leongatha North
Bowran, L. G.	"Glendare," Tallangatta	Longerenong College ..	Dooen
Bright, George H. ..	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Castle, L. H.	Clarinda	Pietsch R. E.	Katyil
Critten, H. S.	Dumbalk	Rintoul, J. T. C. ..	Glengarry
Dookie Agricultural College	Dookie	Roy, W. A.	Morrell's Hill, via Boolarra
Doornbusch, John L. ..	"Starpark," Nhill	State Experiment Farm	Rutherglen
Fairchild and Clutterbuck	Tinamba	Sutherland, R. N. ..	Nullawill
Geddes, L. D. ..	Bungaree	Trenery and Soderlund	"Promview", Foster
Harrison, C. T. ..	"Eastside" Stud, Pomborneit	Trigg, A. J.	Bungaree
		Trigg, N. H.	Bullarook
Hawtin, I. E. & F. ..	"Rossmoyne," Colac.	Tweddle, J. T. ..	"Winlaton," Shepparton
Haywood, Dr. A. R. ..	Hastings	Walch, M. U.	Baring

Live Stock Notes

Compiled by A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

Dairy Cows.

MAINTAINING high production and keeping the cows in good condition during the winter are of great importance where cows are being calved down earlier, or where a fixed contract quantity of whole milk has to be supplied. Butterfat producers find that their returns are increased considerably when the majority of their cows calve early and are liberally fed until the spring growth is sufficient to carry them in full production, but this procedure requires to be carried out in conjunction with other improved farming methods, particularly as regards the conservation of sufficient hay, silage, or other fodder. What little growth there is on winter pastures is very watery, and usually insufficient to maintain cows in strong condition, let alone high production. Some form of supplementary feeding therefore is necessary.

The bulk of the supplementary rations should comprise home-grown fodders, and these can usually be grown, harvested, and stored for less than half the cost of the cheapest purchasable foodstuffs. Unless high production figures are being aimed at, it is not absolutely necessary to feed concentrates with winter pastures and home-grown roughages. Cows in a good average commercial herd should produce 1 lb. of butterfat per day on the average during their lactation periods. With concentrates, it is possible to lift this average up to 1½ lb. of butterfat daily, while some individual cows may produce over 3 lb.

Whether this heavy feeding, necessary to produce high records, is warranted, depends, firstly, on the cost of buying or growing concentrates, and, secondly, on the prices received for the produce. It certainly pays to feed heavily for the supply of whole milk at 1s. 2d. per gallon to a city retailer or for obtaining high records from stud cows to show their productive ability, and to assist the sale of bull calves and other stud stock.

Dairy farmers wishing to buy feed at the present time will find that limited quantities of flax-boll chaff are obtainable from the various flax mills at reasonable prices. Flax-boll chaff is a very good roughage for dairy cows, and can be used to take the place of hay or silage, but it is not a concentrate and will be of most value to those farmers who have to buy roughage.

There are also quantities of malt coombings available from maltsters. The prices are variable, but they can be obtained as cheaply as 2s. 6d. per bag, weighing 60 to 70 lb., with a refund of 10d. for each bag returned in good order. Although not so palatable, malt coombings otherwise are as good a feed for dairy cows as bran, and they can be purchased at half the price.

Feed barley is also very cheap, and can be purchased from the Australian Barley Board at from 2s. 5d. to 2s. 8d. per bushel in 50-bag or full truck lots, and 2d. per bushel dearer in smaller quantities on rails at country sidings, where the barley is held in stacks by the Board. The price is 3d. per bushel dearer for all lots purchased ex-store Melbourne. Crushed or ground barley is a valuable feed for dairy cows if fed with a protein-rich feed. By mixing ten parts of ground barley with one part of meat meal, or two parts of peanut meal, or three parts of linseed meal, or four parts of maize germ (polly) meal, a balanced ration is made for feeding with hay or silage and green winter pasture.

Where possible all early heifer calves should be reared to maturity, as they usually do better and grow into larger cows than late calves. Early calves can be carried through the winter on bucket feed, and will be ready to turn out on the spring pasture. They also can be weaned before harvest time while there is still good grazing available.

Judging from the greatly increased number of dairy cows sold for slaughter during the

past six months, more heifers than usual will be required for replacement purposes. Prices for culled cows are sufficiently high to induce farmers to cull more heavily, but, as good dairy cows also are selling well, the cost of rearing more heifers is warranted.

Sheep.

During the month, crutching should be completed in late districts. When crutching a good "blow" should be taken over the tail, and the legs and inside of the crutch should be well cleaned.

Where lambing is in progress, or about to commence, it will be necessary to inspect the lambing ewes at least twice a day. Only quiet working dogs should be taken among the ewes. Where the shepherd is attending stud ewes, particularly ewes belonging to the smaller British breeds, Corriedale or Polwarth breeds, it is usually worth while offering the shepherd a bonus for each stud lamb successfully reared.

Before lambing commences, several hurdle pens should be placed near the sheep camps in each paddock for holding the ewes which have to be handled.

If a young lamb is seen to be weakening instead of gaining strength, the mother should be examined to see if there is anything wrong with her teats. Tightly sealed teats should be eased by drawing off a little milk, but it is most desirable that the lamb gets the first drawn milk.

[N. A. Bowman, Sheep and Wool Expert.]

Horses.

With the approach of winter, horses at work may be given an increased and more stimulating ration. Stabled horses at work are better clipped, except for the legs. Working horses not stabled should also be clipped and fitted with a good type of waterproof canvas rug. All horses, of course, must be groomed thoroughly every day, special attention being given to rugged horses. Rugs should be thoroughly brushed and cleaned on the underside every day.

Horses at pasture should have their feet regularly trimmed, and before winter sets in it is advisable for all animals requiring it to receive veterinary attention to their teeth. Regular dental examinations are essential to keep horses sound and well.

Weaned foals should have plenty of nourishment; excellent additions to their diet are half a pound of crushed oats, together with a tablespoonful of di-calcic phosphate and one tablespoonful of cod liver oil, or an equivalent amount of a substitute fish-liver oil, in a little damped bran and chaff, twice daily.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Grain for Pig Feeding.

Food costs are just as important to pig raisers as the price of pigs, therefore the improved facilities recently provided by the Australian Barley Board for pig raisers to purchase feed barley economically should encourage farmers to make the fullest possible use of their pig raising resources.

In Victoria most pigs are raised on dairy farms where milk by-products form the base of their diet, and any increase in pig production is largely dependent on the purchase of cereal grains from other districts. This is a weakness in the pig industry, as it involves the cost of handling and transport of grain from one district to another. Up to fifteen bushels of grain may be used in the production of a bacon pig, thus handling and transport costs at 6d. per bushel would represent a considerable cost per pig. Such waste should be avoided by growing the food and the pigs on the same farm wherever practicable.

Grain farmers who feed a portion of their grain to pigs may have sufficient milk or may have to purchase other protein and mineral supplements, such as meat-meal and lime, to balance the grain in the pigs' diet, but the grain could comprise 90 per cent. of the diet.

Pig raisers who have milk, but are unable to grow grain for their pigs, should purchase and use grain carefully in order to keep down their pig production costs.

At present there are ample supplies of feed barley, and the relationship of pig prices to barley prices is favourable to pig production.

To assist pig raisers to purchase economically, the Australian Barley Board, 483 Collins-street, Melbourne, has agreed to sell direct to pig raisers in lots small enough for them to handle. Lots of 50 bags or 11 or 16 ton truckloads may be purchased direct from the Board at the prices quoted in the daily papers at loading stations. These prices range from 2s. 5d. per

bushel for feed Cape to 2s. 8d. for English No. 3. When barley is loaded by the Board from Melbourne, stores prices are 3d. per bushel higher. Lots of less than 50 bags will be supplied at 2d. per bushel higher than 50 bags or truck lots. Pig raisers in most parts of Victoria should be able to land feed barley at their home stations for less than 3s. per bushel.

Pig raisers are advised to meet the present shortage of pig meats, now that grain is available at attractive prices, by carrying their porkers to baconers, and their baconers to heavier weights than those at which they usually sell. There is a good demand for pigs up to 160 lb., dressed weight, provided they are not excessively fat. To obtain heavier weights without having pigs too fat, the pigs' ration may be restricted during the last few weeks of topping off.

When the object is to make the maximum use of grain to increase pig production, as little as half a gallon of separated milk or ¼ lb. meat-meal per pig daily may be fed with as much grain as the pigs will eat, provided water and pasture or green food are available, and some lime is given in the rations.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry.

Egg Production.

The position created recently, in which the demand for eggs greatly exceeded the supply, is unique in the history of the poultry industry of Victoria.

Several factors are responsible for the shortage of eggs. The war effort has created a demand for manpower, which has considerably reduced the labour available on poultry farms. The high cost of production brought about by dearer labour, the problems experienced in purchasing feed, and transport difficulties in the marketing of eggs and the carriage of foodstuffs have seriously affected the poultry farmer. These considerations, in addition to other factors, have made it difficult, and in many cases impossible, for the poultry farmer to continue, consequently considerable reduction has taken place in the number of birds kept for egg production throughout the State. The period of low egg production occurs during the colder months of the year, and this, in addition to the influx of population creating an increased demand for eggs, has caused the position to become more acute.

Poultry keeping for egg production may be conducted successfully in many parts of Victoria, either in a large way, as an adjunct to general farming, wheat growing, fruit growing, or dairying, or in conjunction with other occupations. The land selected should be well drained, and there must be a permanent water supply available for all purposes. As a side line, a flock of 300 White Leghorns or Australorps may be kept for the production of eggs without seriously interfering much with the other work. In a large way, as a sole means of occupation it requires special adaptability for the work, and a sound practical knowledge of breeding, incubation, feeding, management of laying flocks, and marketing. It is recommended that approximately 5 acres of land be procured, which should include sufficient good land to grow all the green food required for all the birds intended to be kept. Until the necessary experience is gained it is advised that a start be made in a small way.

At the commencement it is most important that only the best stock should be purchased for the purpose of breeding to build up the flock. It is infinitely better for the beginner to start with a few of the best breeders than to obtain a great number of inferior birds just because they are cheap. If this advice is not carefully followed failure may result, as birds bred from unsound stock will not possess sufficient constitutional vigour to resist disease and changes of climate. Probably the best way to start would be to purchase, during the months of July, August, and September, day-old chicks from the most successful commercial poultry farmers. The principal birds kept for egg production are White Leghorns and Australorps.

The housing accommodation for the birds should be properly constructed, but need not necessarily be expensive. The houses should be of the proper height, properly ventilated, free from draughts, rain proof, and the floor high and dry. A concrete floor is safe, sanitary, and permanent. Four to six inches of clean straw litter should be placed on the floor in order to keep the birds warm. This should be cleaned out at intervals of not less than three months. At least 4 square feet of floor space should be provided for each bird, to avoid overcrowding. If the ground is in a well sheltered position, it is best to face the houses to the north, as this allows the sun to reach the floor during the day which will keep the litter dry in the colder parts of the year.

In regard to feeding, it is only reasonable to expect that poultry will not do well if their rations are deficient in quantity and quality, or improperly balanced. It is necessary to feed a variety of foods in order to increase palatibility and to maintain bodily health. A monotonous diet must be avoided. It has been found that some foods contain certain essential constituents necessary for the maintenance of good health while they are deficient in other foods. This may be provided for by a combination of foods properly chosen. Green food is a most important necessity on every poultry farm, and a continuous and varied supply must be provided. Not less than 5 to 6 lb. of chaffed succulent green food should be supplied to every 100 adult birds daily. Shell grit should always be available, and a liberal supply of pure, cool drinking water should be kept continually before the birds.

Care should be taken to keep the houses clean, and the perches should be regularly treated with a good disinfectant, such as crude oil, tar oil, &c., in order to prevent the introduction of red mite. These are very important considerations if the good health of the birds is to be maintained.

The book on poultry farming published by the Department of Agricultre contains further information on all phases of the industry, and may be obtained upon application to the Director, Department of Agriculture, Melbourne, C.2, price 2s. 6d., which includes postage.

[H. F. Clinton, Poultry Expert.]

Bees.

For the time being the main work of the apiary is at an end, and beekeepers should use this slack period by giving attention to the processing and marketing of the season's wax. Large quantities of beeswax are used in the manufacture of munitions, and beekeepers can contribute to the war effort by rendering down all damaged and useless combs and small broken pieces, often seen lying about, and of insufficient value to attract immediate attention. An extra ounce of wax from the 90,000 hives in Victoria would produce a further 2½ tons for war requirements.

The hive boxes, stands, and covers should be examined, and any repairs effected. Those requiring to be painted should be given at least two coats of a good-quality paint. To conserve stocks of lead for the war effort, a good and serviceable paint may be made from pyrites (oxide of iron) and linseed oil. Hives should be tilted forward a little so that water will not lodge at the rear of the bottom board and cause rotting. Surplus combs should be stored away and fumigated with carbon disulphide to destroy any wax moths or their eggs which may be present.

Migratory beekeepers who have not yet moved their bees to winter quarters should do so without delay, as the few grey box and ironbark trees still in bloom will be of little use on account of the blossom producing insufficient pollen and, at this time of the year, honey with a high moisture content which may possibly be the cause of heavy winter mortality.

In the central district grey box yielded fairly well, but, with few exceptions, the unfavorable weather conditions were responsible for disappointing yields from grey box in other areas.

[J. W. Thomlinson and A. W. Collins, Apiary Inspectors.]

VETERINARY NOTES.

Avitaminosis in Poultry.

Avitaminosis is the most important nutritional disease found in poultry in this State, and causes serious losses amongst poultry if not guarded against. These losses are brought about not only by deaths of affected birds, but also by serious diseases in egg production, growth, and general well-being of the birds. The cause of the disease is due to a lack of vitamins in the diet. These vitamins are normally found in fresh green food, and when the supply of this is lacking in quantity or quality, it must be made up in some other way.

Symptoms.

Yellow pustules or pimples are noticed in the throat, gullet, and even down to the crop. Cheesy material or whitish flakes appear in the eyes which have a swollen appearance, with watery discharge, while a discharge appears from one or both nostrils which may block up the nostrils and cleft of the palate with a cheesy deposit. The symptoms are often mistaken for other poultry diseases such as fowl pox or roup, catarrh, or common "cold", laryngo-tracheitis, &c., and a differential diagnosis can only be made by expert examination.

Treatment.

When birds are found to be suffering from Avitaminosis, a daily supply of good-quality green feed such as silver beet, spinach, lucerne, green grass, &c., will readily overcome the deficiency. It is preferable to feed this alone at mid-day, as if it is chopped up and mixed with the mash, sufficient green stuff may not be in the mixture or the increased bulk may prevent the bird from receiving sufficient other foods.

In the absence of sufficient or suitable green stuffs, the deficiency can be overcome by the addition of a good-quality fish oil with a guaranteed vitamin content. This will necessitate feeding some of the mash in the wet form. One to two pints of oil should be added to each 100 lb. of dry mash. First mix the oil with a little bran, and then thoroughly incorporate this with the remainder of the mash, and feed daily.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Wheat and Barley Prices for Poultry and Pigs

The Australian Wheat Board prices for wheat for poultry and pigs in July, 1941, were 4s. 3¾d. per bushel in truck lots, and 4s. 3d. per bushel for 1,000 bags and over. In December, 1941, the prices were 4s. 0¾d. and 4s. per bushel respectively. Representations have been continuously made by the Minister of Agriculture, Mr. Hogan, for a further reduction in wheat prices for poultry and pigs. The Board has decided to make available for poultry or pigs wheat in truck lots at 3s. 6¾d. per bushel, and for lots of 1,000 bags or over 3s. 6d. per bushel, both prices being on a "Williamstown basis," i.e., the buyer pays freight between sending station and destination, but is allowed by the Board freight between sending station and Williamstown. He thus gains an advantage between ordinary freight rates between Williamstown and his station and the lower rates applying for the longer route between sending station and destination. For example, railway freight for 150 miles is 12s. 2d. per ton. For 100 miles it is 10s. 3d. per ton, and for 50 miles 6s. 8d. Therefore, if the distance between sending station and Williamstown be 100 miles, and the distance between Williamstown and destination 50 miles, the buyer would have his wheat trucked for 1s. 11d. per ton as against 6s. 8d.—a saving in freight charges of 4s. 9d. per ton.

In districts where wheat is grown and wheat stacks are open, any one can purchase from the Board at the stack wheat in any quantity from one bag upwards, but for less than truck lots they must arrange to take delivery by road, or make their own arrangements with the Railway Department, regarding trucking and consigning wheat.

These reductions in wheat prices follow closely on the successful representations made by the Minister to the Australian Barley Board for the releasing of 50 bag lots of barley to consumers and distributors at the same price per bushel as for truck loads. Feed barley may now be purchased direct from the Australian Barley Board, 483 Collins-street, Melbourne, in 50 bag lots or full truck lots at the following prices on trucks at country railway stations where barley is held by the Board:—

Feed Cape	..	2s. 5d. per bushel
Feed English	..	2s. 7d. per bushel
Cape No. 3	..	2s. 6d. per bushel
English No. 3	..	2s. 8d. per bushel

Smaller quantities of barley down to bag lots will be made available at an increase of 2d. per bushel on the foregoing prices.

Dingee Irrigated Pasture Competition

By H. HANSLOW, Commissioner, State Rivers and Water Supply Commission.

A section of the farm of Mr. M. Bayliss, winner of the pasture competition.

WITH the object of improving pastures and summer crops and controlling irrigation water in the Dingee and Calivil Irrigation Areas, the Bendigo and Dingee Herd Test Association organized competitions for permanent pasture, summer fodder, and for the farm with the best control of water for irrigation and provision for drainage. The prizes were donated by the Northern Seed Supply Company, Bendigo, and the State Rivers and Water Supply Commission.

Mr. L. C. Bartels, Senior Agrostologist of the Department of Agriculture, Mr. Hamley, Vice-President of the Association, and the writer judged the competition.

The first judging was made in the second week in November. The winter had been very dry with feed fairly scarce, with the result that most of the paddocks had been cleaned of roughage. Plentiful supplies of irrigation water were available early in the season, followed by good spring rains, and the district was looking very well. The judges were agreeably surprised at the great improvement in the district, which, they found, had been brought about largely by a more liberal use of superphosphate. It appeared that in this district the Commonwealth Government's bounty on the use of superphosphate had been more than justified by the extra and better production. Wild white clover, sub-clover, and rye grasses were crowding out the inferior types. These inferior grasses, clovers and rushes, however, were more in evidence than was desirable, and it is to improve this condition that the competition was held.

The Dingee irrigation district is very flat and drainage is difficult. Furthermore, a considerable portion of the district is subject to occasional winter flooding. However, the drainage scheme at present under construction by the State Rivers and Water Supply Commission will be of great assistance in this regard when completed.

Many of the farms inspected were laid out many years ago and it appears that, in an endeavour to save land, the internal supply channels were made on the small side. These channels, which are often in use, could be enlarged and this would result in a great saving of time. Another source of loss of inefficiency

Approved types of stop and outlet in farm channel.

is the practice of digging channels out to clear them of weeds. This has had the effect of making them so deep that they are never emptied, with the result that fluke snails are in many of them, and cows and sheep and pigs may become affected. This can be prevented by "blue-stoning" the channels in May and November and by drenching the stock with a carbon tetrachloride drench. Water permanently lying in the channels is favorable to the propagation of "yabbies," which make themselves troublesome by burrowing around the structures.

Irrigators would save themselves much time, work, and inconvenience and also give themselves a greater control of the water by constructing permanent stops throughout their irrigating systems. Information on these structures may be had in a booklet which will be sent free of charge on application to the State Rivers and Water Supply Commission, Melbourne, C.2. These structures are not expensive, and with the present labour shortage, irrigators would be well advised to install as many as possible in the coming winter.

Some of the irrigators are making very good concrete structures. However, very few permanent outlets from the channels were noticed. Such outlets save a lot of shovel work in cutting and repairing banks, and give better control of water.

Care should be taken when constructing culverts not to make them too small, thereby causing heading up of water in the channels.

One of the greatest difficulties, both to the irrigator and also to the Water Commission, is the control of weed growth in the channels. Many farmers claim that by having the channels deep there is not so much weed growth in the centre of the channel, although the edges and banks are covered. By having water in the channels all the time, there is a danger of causing an increase in the water table, and in "salty" lands, it may help to increase "salt" troubles through seepage. Some of the Dingee farmers are setting an example in progressiveness by the use of aflame thrower to burn the weeds off their channel banks. Although not completely effective, it is claimed to be an improvement on other methods used, and well worth while. On the dried fruit blocks at Woorinen the growers are using flame throwers extensively. The Water Commission is also carrying out experiments in weed control in channels by the use of sprays; the results with "Atlacide," for example, have been very favorable, but, owing to the war, this chemical is unprocurable. Arsenical weed killers also gave good results, but the danger of poisoning stock makes the Commission hesitate to use them.

The increase in wage costs emphasizes the need for better methods of water control. On most of the farms inspected it was noticeable that all the openings cut in the banks to allow water on to the bays were very small, and it seems that the channels are filled with water, many gaps are opened, and the farm irrigates itself because, although many "wheels" were revolving, an irrigator could seldom be seen. Everywhere in the irrigation areas such evidence of the careless use of water is seen far too often.

On an irrigation farm the most important job is irrigating, and in very many cases it is the one that gets the least attention. Throughout the irrigation districts more land has been spoilt and more farmers have failed through careless use of water than for any other reason. On the other hand, the most successful men

have been heavy users of water, but have made their success by careful use of water and by the correct layout of their properties to facilitate this, together with a liberal use of superphosphate.

Many farms inspected were laid out years ago, and the check banks have worn down so low as to give little control of the water. The banks should be high enough to prevent the water overflowing. When a bay has had sufficient water, another irrigation from an adjoining bay does not improve matters. It wastes water and will bring up undesirable grasses, rushes, and weeds. Even when the banks are well made and the land well graded, careless use of water to a large extent will lessen the results of previous good work. The art of irrigation is to put sufficient water on land to grow the maximum crops without damaging the land or crop. To obtain the best results from the use of water, a good head of water should be turned into the bay—in other words, it should be flooded and the water should be shut off when there is sufficient on the bay to carry it to the end with as little to drain off as possible, after the ground has absorbed sufficient water to take the moisture to the depth of the plant roots. If water overflows the channel or check banks, or if the land has not been carefully graded, you cannot do this. Consequently, some land gets too much and some too little. Again, if the bays are too long, it is most difficult to judge when to shut off the water. Over-watering, as mentioned previously, will bring up rushes and "nut-grass"; it makes conditions more favorable to the growth of paspalum dilatatum and paspalum distichum than to better grasses, such as rye, cocksfoot, and prairie grass. A more frequent use of the mower following the cows should be made where possible, and the cuttings left to rot on the ground to help build up the humus content of the soil. With the coarser growths removed, the clovers and finer grasses will be uncovered and made available to the stock. When making hay the bottoms and tops of the stacks, where the most waste takes place, could be made from the rougher growths of the paddocks. This will serve the dual purpose of improving pastures and protecting the better fodders in the stack.

To get the utmost from the use of the water from an 80 or 90 acre-foot water right, is a full-time job for one man. Admittedly, labour

An excellent pasture of irrigation white clover.

A prolific crop of Sudan grass on the property of Mr. H. T. Humbert, winner of the summer fodder competition.

[*Weekly Times photo.*

shortage at present is a restricting factor, but in normal times the work involved would be justified in the production of extra and better grasses and clovers.

One of the greatest irrigation difficulties in the Dingee district is the need for drainage. This is another reason why great care should be taken not to over-water.

Another problem with irrigators is how to deal with deep depressions. An example of how to deal with such a problem may be found on the property of Mr. Bray in the Goulburn Valley. There was a deep depression on Mr. Bray's farm, and to this he connected his irrigation and drainage channels. In some places the water is 2 to 3 feet deep. All surplus drainage water is turned into this basin, which has been planted with Poa aquatica, paspalum, and strawberry clover, and liberally manured when dry. In the 1938 drought the swamp dried up and the land was then top-dressed at the rate of 11 cwt. of superphosphate to the acre. Subsequent improvement in the pasture has more than justified this liberal manuring. Mr. Bray is carrying and fattening a beast to the acre on this swamp. This is an example that might well be followed with advantage by farmers who have such a depression on their property.

It was noticeable on many properties that very little attention had been given to the provision of water for stock—generally the cattle were allowed to water at the delver channels, or drains as they are often miscalled. The water in the channels gets warm in the summer, and the farm stock do not drink as much as they should. Farmers should construct a small dam in each paddock, about 10 yards square, at the top of the paddock, alongside their irrigation channel. The irrigation water could be run through the dam. The bank around the dam could be blocked at the same time as the channel to keep all surface drainage out. In this way a more palatable stock water supply would be provided. In constructing such a dam the surface soil from the excavation could be used with advantage to fill some hollow spot in a paddock, while the subsoil could be used for blocking gaps in channels, &c.

In the competition there were not many fodder crops exhibited, but of those entered three were very good and well laid out, with a great bulk of feed which ought to pay the growers well for their enterprise.

At Dingee the flatness of much of the land, together with the need of drainage and an occasional winter flooding, makes it very difficult to keep the land free from rushes and the coarser growths. Heavy stocking and mowing the roughage, allowing it to rot on the ground, could be combined with the growing of clover together with a liberal use of superphosphate. The fertility of the soil will be quickly built up by these methods, and it may become desirable to plough up and reconstruct pasture lands progressively, say, on a ten-year rotation. The land could be ploughed in the autumn, sowing oats with a bag of superphosphate, and in the spring Sudan grass with a bag of superphosphate to the acre. There will be no loss in doing this and these paddocks ought to give immense crops. Then remodel the channel, grade and checkbank the land well, and make a perfect job of it. Sow down with lucerne where the land is suitable, and, as the lucerne thins out, thicken with pasture, sowing only the very best certified seeds, and in a few years Dingee will be one of the show spots of Victoria.

Mr. M. Bayliss, who was awarded first prize in the Permanent Pastures Section of the competition, has a block of 40 acres, with a water

right of 40 acre feet. The whole area is sown down to permanent pasture. The pastures were submitted in good condition. The mixture adopted for the most recent sowing (Autumn, 1941) was—

	Per acre.
Perennial rye grass	8 lb.
Lucerne ..	.. 2 lb.
White clover	.. 3 lb.
Paspalum	.. 2 lb.
Prairie Grass	.. 2 lb.

The perennial rye grass was a mixture of Colac perennial rye and seed from old irrigated pasture developed locally. This mixture was sown with 90 lb. of manure. Ordinarily Mr. Bayliss top dresses at the rate of two bags of superphosphate per acre, but he has had to reduce that rate.

Portion of the fodder reserves on the property of Messrs. Nickols Bros.
[*Weekly Times Photo.*

An older pasture in which the local strain of Irrigation White Clover was introduced, presented a dense sward with the clover as an outstanding feature. In condition, the channels varied from good to poor, and in some cases more attention to drainage seemed desirable. Weeds were not very evident. The relatively small area of the block permitted effective management, but productiveness was illustrated by the carrying capacity. At the first inspection Mr. Bayliss was milking 36 cows. Other stock carried were four dry cows, twelve calves, six poddies, and two horses.

Mr. F. Anset was placed second in the list of awards. This competitor is dairying on an area of 110 acres, and at the first inspection his property was carrying 66 head of stock, including 41 milking cows, 4 horses, and 2 bulls.

The block has carried up to 110 head of cattle, but at present Mr. Ansett has had to modify his programme because of his son's enlistment.

The block is subdivided into fourteen paddocks. One paddock is planted to lucerne, and the others carry pasture. Two of the pasture areas are dominantly subterranean clover and the others have perennial elements; only half of these were sown. The other half represents voluntary development.

In his first sowings of pasture Mr. Anset used a varied mixture, but he maintains now that "Dingee White, with a little bit of rye," is a combination suited to his conditions. In this Mr. Anset subscribes to the principle that a simple mixture of rye grass and white clover is sufficient, and he puts a premium on the Dingee strain of Irrigation White Clover.

Ordinarily, this competitor applies an annual dressing of superphosphate at the rate of 200 lb. per acre, and he is confident more could be used with advantage.

Mr. Anset had done much on his property to offset the natural disadvantages of flat grades. The channels were relatively clean and some provision had been made for drainage. The mower had been used to clip off rubbish from some of the pasture paddocks. It not only repressed weed growth but improved the appearance of the sward, and encouraged a fresh growth of nutritious and palatable herbage, in place of the coarse seed stalks of paspalum, "nut grass," and other undesirable grasses which had previously dominated the pastures.

Conditions at Calivil are different from those at Dingee. Messrs. Lush and Ray's block was 267 acres in area, with a water right of only 48 acre feet. These competitors have been on their block for eight years, and cleared it from a state of virgin forest. The block is now enclosed and subdivided into eleven paddocks. Sixty-four acres of the area is under irrigation.

The soil is a sandy loam, and lucerne was sown originally. It is being converted to pasture by oversowing with Wimmera rye grass and white and subterranean clover. Last year superphosphate was applied to two of the paddocks at the rate of three bags per acre, and two bags per acre to another. In early November

a dense crop of luscious mixed rye grass, lucerne, and clover had developed and was subsequently cut for hay.

Mr. A. Kelynack, who manages a small farm of 26 acres, deserves mention for the general trimness of the area. The condition of his pastures and sheep grazed thereon demonstrated what can be done in irrigated pasture management on a limited area.

Threshed straw from irrigation white clover and rye grass on the farm of Mr. J. W. Jackman. [*Weekly Times photo.*

Control of Water for Irrigation and Drainage.

Estimates are frequently heard of the huge population Australia could maintain. However, the actual number Australia could provide for will be governed more by the amount of water available than the area of land. If ever these estimates are fulfilled, much greater care will have to be taken of our valuable water supplies than is taken to-day.

In addition to what has been done in the matter of irrigation, many large irrigation schemes are under consideration. The project of turning the Snowy River from south to north is at present being considered, and also the enlarging of the Hume Reservoir from 1,250,000 acre feet to 2,000,000 acre feet, and the Eildon Reservoir to over 900,000 acre feet. The Commission has on hand applications from irrigators in the Goulburn system alone for over 50,000 acre feet of additional water rights.

Across the mouth of the River Murray great barrages several miles in length have been constructed to prevent the tidal waters running up the river. In passing, it may interest readers to know that for nearly two years—in 1939 and 1940—after these barrages had been completed, no water from the River Murray flowed into the sea.

The Water Commission recently extended pipe-lines from Bunyip to Point Nepean, and also from the Otways to Warrnambool. These activities are but a portion of the general plan to bring more and more land under irrigation.

In Victoria alone the capital cost of water supply is in the vicinity of £28,000,000. This figure, while giving an indication of what has already been done, also emphasizes the desirability that those benefiting from irrigation should make the fullest use of such a valuable asset by using the water in the most efficient manner.

Of the water that leaves the Commission's storages, only 50 per cent. reaches the land. The remainder is lost in evaporation, seepage, and leaking structures and channels, due to insufficient funds for maintenance. Northern Victorian storages lose 5 feet a year by evaporation, and a thick growth of the weed "Cumbungie" transpires the equivalent of 8 feet of water in a year.

The irrigation channels were constructed to supply water to what is termed "full supply level," but much land above this level has been planted. To water these lands more water has to be carried than the channels were originally constructed for. The raising of the water to these levels adds greatly to maintenance costs and delays delivery of water to other irrigators lower down.

The Commission has decided that it will continue to supply water to these lands, but from now on irrigators are advised that, before they plant any new areas, they should make certain these lands are under full supply levels, otherwise water will be refused. The watering of these high lands, together with weed growth in farmers' channels, many of which are too small to allow the farmer to finish his irrigating as quickly as he should, has delayed the run of water in some districts, causing a great loss in production, especially to those irrigators on the lower end of the channels. In addition the Commission's maintenance costs are greatly increased.

Much farming land has deteriorated through the overflow of farm channels. An amendment in the Water Act has been made which gives the Commission power to refuse to supply any irrigator whose internal channels are not in

a proper condition to take water. On many farms it is impossible to get water to the far end of the channels without it overflowing and flooding large portions of the farm the irrigator had no intention of watering, thereby damaging the land, reducing income, and wasting water. Partly as a result of this, far too much water goes down the drainage channels. Some water must go down the drains, but not anything like the quantity often wasted in this manner. In addition to this waste, the overflow causes more weed growth in the drainage channels and increases the cost of cleaning them. Water wasted in a good year would be very valuable in the reservoir for the dry year that may follow.

Mr. M. Bayliss, winner of the pasture competition at work on his Dingee property. [*Weekly Times photo.*

In an endeavour to educate farmers and show them the advantages that would accrue by having a better control of water, thus saving labour, time, and the deterioration of land, the Commission is offering prizes for the farm with the most efficient use and control of water, both for drainage and irrigation. The first prize is 10 acre feet of water, the second prize is 5 acre feet—ten entries being the minimum for which a second prize will be given.

In the Dingee competition there were seven entries and two judgings were made. In the second judging all competitors except Mr. Bayliss lost points, compared with the first judging, on account of increased weed growth in the channels. This is a reflection of the shortage of labour at the present time.

Mr. Anset, winner of the competition, had made a very good effort at water control. His permanent stops of concrete and timber were very well made and effective, and he had more of them than his competitors. Generally speaking, Mr. Anset's channels were bigger than those of the other entrants, he had made more provision for drainage, and the channels were freer from weeds.

Nickols Bros. were second in the competition, and although the number of entries did not permit of a second prize being given, these competitors are to be commended on their effort.

Mr. H. J. Hamley handling certified seed from irrigation white clover. [*Weekly Times photo.*

Annual Summer Fodder Competition.

Mr. H. Humbert won the annual Summer Fodder Competition with an area of Sudan grass which, at inspection, was a dense matured crop. It was sown in November after rain (1½ inches) with seed at 12 lb. per acre, and manure at the rate of 1 cwt. per acre, 2 to 3 inches deep. It was brought up by rain and was not watered for nearly a month afterwards, when it showed the need for irrigation.

The crop has been grazed more or less continuously since the New Year. Mr. Humbert has grown Sudan grass for three seasons, and he has had no trouble with it. Sudan grass grows with less water than millet. In fact, it is not favoured by too much watering.

Mr. Strachan exhibited an area of 10 acres of Sudan grass which was presented in a fresh green condition, representing a fortnight's growth after the first grazing. In preparation, the land had been ploughed in winter, but sowing was not done until the beginning of this year, and the land was watered before sowing. Seed at the rate of 14 lb. per acre was sown through the grain run of the drill. It was given 70 lb. of superphosphate. The depth of sowing was 3 inches. Germination was patchy, and a second irrigation was given three weeks after sowing. The land had been checkbanked; the bays were 10 chains long, and ½ chain wide. The checkbanks were not sown and were overgrown with weeds.

Mr. Strachan had previously grown ambercane and had numerous losses from poisoning, although he has decided that irrigation before grazing would avert trouble.

Mr. J. Humbert had an area of 9 acres of Sudan grass, on an area which bore a crop of Sudan grass last year. The land was scarified in winter and sown after 1½ inches of rain in November. It was put in with the combine and rolled. The rate of seeding was 15 lb. per acre, and superphosphate 1 cwt. per acre. The crop was watered once a month after sowing. It was grazed first on Christmas Day and at intervals—five times subsequently. It has been watered every three weeks, but the ground takes only 2 inches at a watering.

Mr. Humbert expected feed for another six weeks. He has never had trouble from poisoning by sorghum.

This crop, although relatively sparse, bore marks of good workmanship, as did everything on Mr. Humbert's farm.

PASTURE COMPETITION.

Name of Competitor.	Layout for Irrigation Condition of Channels and Drains.	Composition of Pastures.	Condition of Pastures.	Uniformity of Swards.	Absence of Weeds.	Total.
Maximum Points	20	20	20	20	20	100
Bayliss, M.	14	17	17	17	17	82
Anset, F.	15	16	16	16	17	80
Lush and Ray	16	14	15	16	16	77
Kelynack, A.	10	15	15	16	18	74
Nickols Bros.	13	14½	15	14½	16	73
Vains Bros.	11	15	15	13	13	67
Brereton, G.	10	12	12	12	14	60

COMPETITION FOR THE FARM WITH THE MOST EFFICIENT USE AND CONTROL OF WATER.

Name of Competitor.	Layout of Farm for Efficient Distribution of Water, including Grading.	Type and Efficiency of Structures used for Control of Water.	Cleanliness of Channels.	Layout of Drainage System and Cleanliness of Drains.	Provision of Water Supply for Stock.	Total.
Maximum Points	30	15	15	25	15	100
Anset, F.	20	12	10	20	7	69
Nickols Bros.	20	10	7	10	7	54
Bayliss, M.	15	5	8	10	2	40
Vains Bros.	16	5	6	3	7	37
Kelynack, A.	15	7	5	3	5	35
Brereton, G.	15	3	7	5	5	35
Hetherington, R. (withdrew) ..	..	..	..	..	..	..

SUMMER FODDER CROP COMPETITION.

Name of Competitor.	Crop.	Layout, Grading, Channelling, Draining.	Uniformity of Crop.	Productivity with Reference to Probable Methods of Utilization.	Freedom from Weeds.	Total.
Maximum Points	..	10	10	25	5	50
Humbert, H. T. ..	Sudan Grass ..	8	8	20	4	40
Strachan, —.	Sudan Grass ..	9	7½	17½	4	38
Humbert, J.	Sudan Grass ..	9	7	15	4	35
Bird, C.	Japanese Millet	5	5	10	4	24

"Tatura Dwarf Globe"

A New Tomato Suitable for Market and Canning

By F. A. MAHER, B.Agr.Sc.,
Assistant Horticultural Research Officer

FOR some years the Victorian Department of Agriculture has been developing strains of tomatoes adapted to local conditions, and to the requirements of the fresh fruit market and canning industry.

For several seasons this work has been centred at the Horticultural Research Station, Tatura, where a considerable number of varieties new to Victoria and many promising selections of well-known varieties have been subjected to trial.

In the main Victorian tomato producing areas notable improvements required in regard to fruit type are as follow:—

(*a*) Improved appearance of fruit—i.e., introduction of smooth round (canning) varieties to replace in part or whole the fasciated Chinese varieties so widely grown at the present time, e.g., Burwood Wonder type.

(*b*) Improved fruit quality. This may be further divided into—
  (i) better carrying quality;
  (ii) higher total solids;
  (iii) better canning quality.

(i) and (ii) may be influenced to a large extent by cultural conditions, but variety is the dominant factor.

A considerable contribution to the improvement of tomato quality in the Goulburn Valley area has been made by the Department of Agriculture in the development of a variety known in trial as Selection "A," but now released as "Tatura Dwarf Globe."

Commercial areas of this variety have already been grown, and it has aroused considerable interest among tomato growers in the Shepparton district. It is likely that a substantial area will be planted to this variety in the Goulburn Valley next season.

The following brief description is for the benefit of growers. For the purposes of record a detailed description of the variety has been included also.

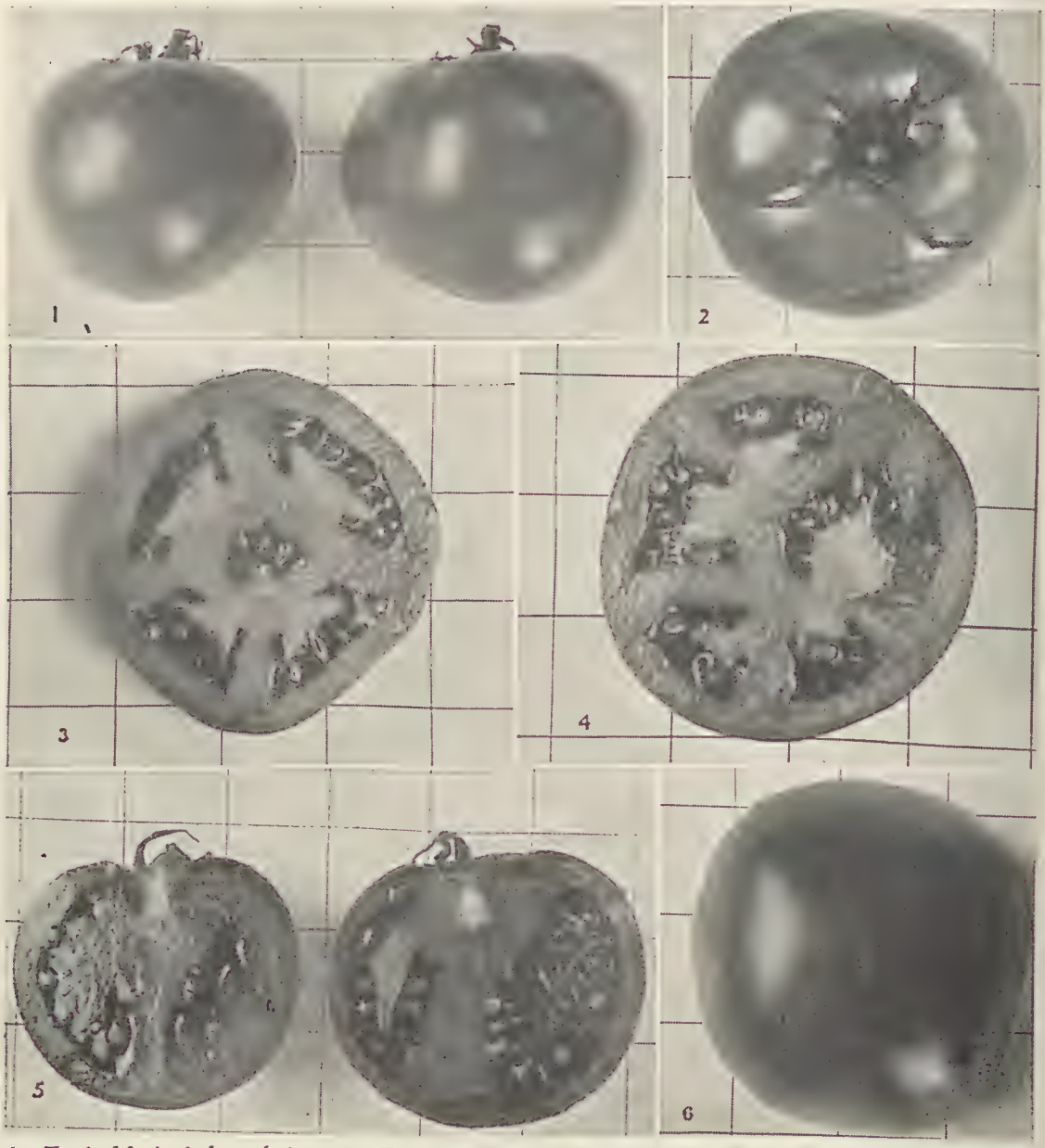
Brief Characterization.

"Tatura Dwarf Globe" is an all-purpose tomato for home, market garden, and canning, particularly in the Goulburn Valley district; habit dwarf to semi-dwarf; moderately resistant to the more common diseases, viz.:—Fusarium Wilt, Verticillum Wilt, Bacterial canker. Second early to mid-season in Goulburn Valley; Second early to late in southern Victoria—Geelong, Portland, Croydon.

Ripe fruits are almost globular, medium to large in size (4 to 7 oz.); cross section almost circular; greatest diameter 2¾-3⅛ in.; depth 2⅜-2⅝ in. Cavity broad, very shallow; corky ring inconspicuous. Stylar end well rounded; scar inconspicuous. External colour at maturity, Capsicum Red (Horticultural Colour Chart, British Colour Council) 715 to 715/3. Inner colour Capsicum Red (715/3). Outer walls thick, inner walls very thick, cells 4 to 7, usually irregular. Susceptible to circumferential cracking under conditions of excessive moisture, but generally not very susceptible.

How to grow "Tatura Dwarf Globe."

The habit of this variety is dwarf to semi-dwarf, and it requires neither staking nor pruning when grown in the Goulburn Valley and southern Victoria. The row spacing will depend to some extent on the method of planting and the method of irrigating the crop, but in all cases at least 4 feet between rows is required. The distance between plants in the row should be at least 2 feet, preferably 2 ft. 6 in. "Tatura Dwarf Globe" has the ability to set almost all flowers produced, and the size at maturity of early settings up to the third cluster is excellent; but thereafter it is difficult to maintain fruit size unless the crop receives liberal side dressings of artificial fertilizers. It is suggested that the plants be given a side dressing of 2:1 superphosphate ammonium sulphate mixture at the rate of 3 cwt. per acre immediately after the setting of the second fruit cluster, and a similar side dressing immediately after the setting of the fourth fruit cluster.



1.—Typical fruits in lateral view. 2.—Fruit viewed from stem end—note slight depressions arising from stem. 3 and 4.—Transverse section of fruit showing interior structure. 5.—Fruits in longitudinal section—note smallness of core. 6.—Fruit viewed from blossom end—stylar scar inconspicuous.

(Scale of graphs 1 inch.)

The excellence of the fruits and sound cropping ability of the plants ensure an economic return for any intensive treatment given to the crop.

Growers who use this variety and find it satisfactory for their purpose would be well advised to save their own seed. The retention of its outstanding characters of fruit shape, fruit size, dwarf habit, and sound cropping ability can be achieved only by intelligent selection, using the plant as the unit.

DETAILED DESCRIPTION.

Adaptability and Use.

"Tatura Dwarf Globe" is particularly suited to Goulburn Valley conditions (Shepparton-Tatura) and has been grown successfully in the Bendigo district. In southern Victoria it has succeeded as a mid-season to late variety. In the Goulburn

Valley and at Quantong it would appear to have a distinct future as a canning variety.

Season.

The variety has not yet been tested over the full planting range under Goulburn Valley conditions. However, when planted at the same time as Burwood Wonder (2nd and 3rd week, October) it has produced mature fruits at approximately the same date—70 to 74 days from transplanting to first commercial harvest. Peak of harvest generally is 100 to 110 days after transplanting.

Plant.

Size.—Dwarf to semi-dwarf; at the time first fruit ripens the plants are typically 15 to 18 inches in height with a maximum spread of 2 ft. 6 in. to 3 feet. Vine character varies little under diverse cultural conditions.

Habit.—At first erect, but as maturity is reached becomes slightly decumbent; growth at all times dense, fruits well shaded. The first two clusters of fruit are seldom visible under the dense foliage.

Branches.—Medium in number, typically 5 to 7, short (15 to 18 inches), internodes short (1 to 1½ inches). Main branches at bases 1.0 cm. diameter. Main stem medium thickness (2 to 2.5 cm.), ¾ to 1 inch diameter at ground level.

Leaves.—Medium size, petioles stout (2½ to 3 cm.), 1 to 1¼ inches long, blades (21 to 24 cm.) 8½ to 9½ inches long; maximum width (16 to 18 cm.) 6½ to 7½ inches. These measurements are typical of plants grown under medium to good fertility conditions.

The upper surface is dark-green; the lower light to medium green. Leaf marginal contour slightly dissected. Large leaflets, usually 7. Small leaflets variable in number, 4 to 6. Main leaflets medium size (6 to 8 cm.) long (3 to 3½ cm.) wide, curling inward under all conditions.

Flowers.—Typically 4 or 5 per cluster, from earliest to latest. Normally sets 3 to 5 fruits per cluster. Pistil 0.6 to 0.7 cm., terminates well within anther ring which is 1.0 to 1.2 cm.

Flower in longitudinal section showing length of pistil in relation to anthers.

1.—A plant of "Tatura Dwarf Globe" showing prolific cropping habit. 2.—Typical leaves. 3.—Fruit truss showing high percentage of fruits set. 4.—Young fruits—note globular shape and nipple at blossom end. (Scale of graphs 1 inch).

Fruit Exterior.

Sepals.—Typically 6 or 7, long and large.

Immature Fruits.—Spherical with distinct nipple at stylar end. This pointedness disappears as the fruit develops. Pale green; darker green colour about stem end disappearing well before the ripening of the fruit.

Mature Fruits.—Medium large, typically weighing 4 to 7 oz. Transverse section practically circular, measuring (7.0 to 7.5 cm.) $2\frac{3}{4}$ to 3 inches by (6.0 to 6.5 cm.) $2\frac{3}{8}$ to $2\frac{5}{8}$ inches—i.e., depth is only 85 to 90 per cent. of greatest diameter. Under severe conditions the polar diameter increases.

Cavity.—Shallow (3 mm.) $\frac{1}{8}$ inch, gradually sloping, slight creases or depressions radiating from the stem. Point of attachment of stem surrounded by small circular corky area, total diameter (1.0 to 1.3 cm.) $\frac{3}{8}$ to $\frac{1}{2}$ inch.

Stylar end of fruit smooth and well-rounded. Stylar scar seldom more than 1 mm. diameter, and is quite inconspicuous. Under wet conditions is prone to circumferential cracking, but it does not crack radially.

Fruit stem adheres firmly to the fruit.

Colour.—Capsicum red (Horticultural Colour Chart, British Colour Council) 715 to 715/3. Skin colour yellow.

Fruit Interior.

The outer walls are thick, typically (0.60 to 0.65 cm.) $\frac{1}{4}$ inch, and the inner walls are very thick (0.8 to 1.0 cm.) $\frac{1}{4}$ to $\frac{3}{8}$ inch. Cells visible when fruit cut at equator typically 5 or 6, rather irregular in shape and arrangement. Well defined solid central fleshy mass, large fleshy placental. Cells small to medium, well filled with pulp; seeds relatively few; seed size medium to large.

Flesh firm. Colour, Capsicum red (715/3) (Horticultural Colour Chart) when fully ripe. Total solids (5.5 to 6.2).

Portion of branch showing habit of bearing. Note short distance between fruit clusters.

Typical leaf of the "Tatura Dwarf Globe."
(Scale of graph 1 inch.)

History.

"Tatura Dwarf Globe" has been developed from a single plant selection made by Mr. D. Koop, of Quantong, Victoria, in 1928 or thereabouts in an area planted to the variety South Australian Dwarf. The first plant selected by Mr. Koop was undoubtedly a hybrid, as it was not until five seasons after the first selection was made that a completely uniform line of plants was obtainable from any of his single plant progeny trials. After growing this variety for several seasons Mr. Koop eventually discarded it because of its tendency to run away to small fruit. Seed of this variety was sent by the local orchard supervisor to a Pomonal grower, and it was from this grower that seed was first obtained for trial by the Horticultural Division of this Department.

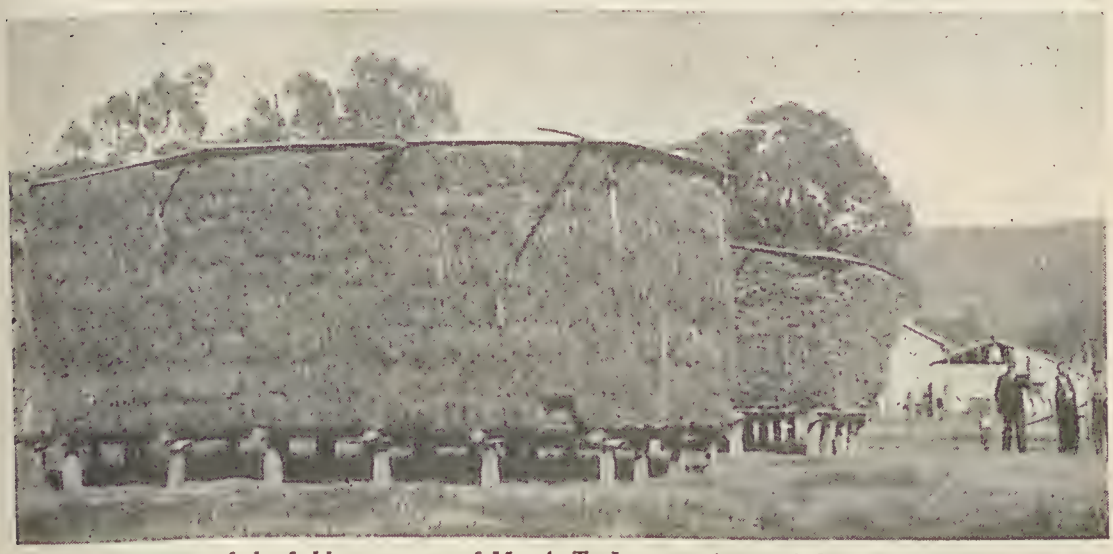
The variety was established at the Horticultural Research Station, Tatura, with the idea of testing its suitability for the main tomato-producing areas of northern Victoria, and, if possible, improving its fruit size.

The results achieved by rigorous selection for improved fruit type have placed "Tatura Dwarf Globe" well ahead of the existing dwarf varieties as a canning and market type.

FODDER CONSERVATION

Competition at Benalla

Report of Judge—W. D. ANDREW, M.Agr.Sc., Assistant Agrostologist



Some of the fodder reserves of Mr. A. T. James, winner of the competition.

FARM competitions have always been well supported by the Benalla A. and P. Society, and this year, despite difficult times, local interest in the fodder conservation competition sponsored by the Royal Agricultural Society was well maintained.

The conservation of fodder for livestock is a routine old-world practice, and it is of very real importance in this country where there are periodically times when pasture growth is scanty and feed scarce, and periods of drought may occur.

Apart, however, from climatic considerations, the improvement of pastures has accentuated the need for conserved fodder. More stock are carried on the better pastures, but as the growth of herbage during winter and summer is still relatively poor, arrangements have to be made to provide more fodder for stock during these periods than formerly. Fortunately, in the spring time, the improved pastures produce an abundance of herbage eminently suitable for reservation, and consequently fodder conservation becomes the natural corollary of pasture improvement.

Throughout most of the North-eastern division of Victoria, the rainfall is fairly reliable, and in deciding upon the reserves of fodder necessary for livestock in this area, most emphasis should be placed on the provision of fodder for feeding during the months of February, March, June, and July, which are the normal times of scarcity of pasture growth.

Each district has particular problems in regard to the feeding of livestock, as climate, soil, and type of stock vary from place to place, but a general principle is that pasture herbage, whether it be succulent or dried, is the cheapest fodder.

A well-built hayshed on the property of Mr. R. T. Hill, Molyullah. This is a variation from the usual type.

Hay.

In the North-east, conditions of low humidity prevail from November onwards, and at that time of the year one can be reasonably sure of intervals of a week to ten days between rainfalls. In consequence, meadow hay making can be carried out with little interference from unfavorable weather. Most farmers press meadow hay directly from the windrow and, provided reasonable care is exercised, there is little danger of the hay overheating and spontaneously igniting. It is desirable, however, to leave the bales out in the paddock for a few days to allow any heat to dissipate before putting them into a shed. This season some farmers, who could not obtain wire, used special twine with satisfactory results.

In general, the hay sheds in the Benalla district are of a good type and well constructed. Mostly, they have a gable type of roof made from corrugated galvanized iron; guttering and down pipes are fitted, and a protective wall of some sort is provided on the side most exposed to the driving rain, while the flooring usually consists of old rails or saplings. A variation from the usual type of shed was seen on Mr. R. T. Hill's property at Molyullah. The roof was made of 10-ft. curved corrugated iron sheets, bolted together along their edges and pinned only along the ridge and to the plate carrying the guttering. By this means, the trusses in the roof were reduced to four, and no battens were needed to provide support for the iron. Mr. Hill stated that the cost of erecting the shed which was 32 feet long, 19 feet across, and 18 ft. 6 in. to the eaves, was £36. Timber used was 3 x 2-in. hardwood for the trusses and ridge, and 6 x 2 in. for the plates. One $\frac{3}{8}$-in. mild steel tie rod was used on each gable.

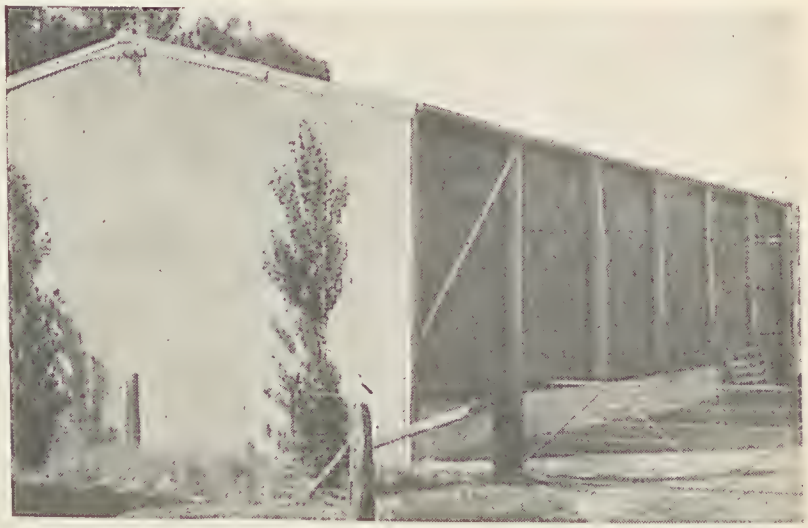
Some prime lucerne hay was exhibited by Mr. G. Grimwade, who has a vigorous stand of lucerne of about 50 acres in a paddock near the homestead. Thirty-two acres were sown early in October, 1937, and 18 acres at the same time of the year in 1939. It would seem that more lucerne could be grown with advantage in the Benalla district, as the climate is quite suitable, and there are plenty of well-drained sites that could be used for this purpose. Early autumn sowing is probably the safest, but spring sowing can be quite satisfactory if the plants can get a foothold before the dry weather sets in. The object of early sowing in the autumn is to get the plants well away before the pea-mite becomes active, and the annual volunteer growth smothers the young seedlings of lucerne. On country that has never grown any leguminous plants of the burr-medick class, it may be necessary to "inoculate" the lucerne seed before sowing to provide the necessary root nodule organisms, but more often than not one finds that these organisms are already in the soil. Inoculation may be carried out by using a special culture obtainable from the Department of Agriculture, or, alternatively, by obtaining soil from an old lucerne field and mixing it with the seed before sowing.

In general, lucerne is most favoured when subjected to mowing, but under dry-land conditions one usually obtains only a spring cut and, unless abnormal rain falls during the summer, the stand is then subjected to grazing for the rest of the growing season. If stock are permitted to graze continuously on the lucerne during the summer and autumn, this will have a more weakening effect on the stand than if it were grazed down quickly to a short stubble and then shut up again until it produced sufficient growth for another grazing. It is problematical whether harrowing of lucerne can be justified generally, but where the soil has been

consolidated badly by sheep grazing, it might be advantageous to break the crust.

On most farms, a surplus of lucerne is made into hay, but it can be ensiled with fairly satisfactory results if the material is allowed to become a little more stemmy than usual before mowing, and is not packed down so tightly in the stack as to restrict heating. The addition of molasses usually improves the silage, but at present there are limitations to the use of this material.

One competitor had a paddock of millet and sudan grass that had been sown in late October at the rate of 8 lb. of each per acre. An admixture of these two provides good grazing for cows during the summer months. Should conditions be favourable for growth during this period the millet responds very vigorously, while if the reverse is the case the sudan grass, which is more drought-resistant, can usually make some growth and avert a complete failure. During conversation, it was disclosed that a paddock sown to this mixture in 1938 made very indifferent growth until February, 1939, when heavy rain caused the plants to shoot up to 6 feet high, and there was such an abundance of herbage that it was mown and ensiled in a trench.



This reserve of baled meadow and lucerne hay on Mr. G. Grimwade's property is well protected.

Silage versus Hay.

In most districts there is some confusion on the matter of making silage, some of it being due to a misunderstanding of the process, but mostly farmers are not able to decide which is the cheaper method of conservation.

Any method necessarily involves a certain amount of wastage of nutritive matter as a result of respiration and fermentation, which are destructive processes, and leaching. Under very unfavorable conditions, this may amount to 40 per cent., although, in Victoria, it is

Cows grazing on a mixture of millet and sudan grass in the Benalla district.

A partly-used pit of silage on the property of Mr. A. T. James, Warrenbayne.

usually less. It is not generally appreciated that as much loss can occur in making hay as in ensilage.

Suppose, for example, one had 10 acres of pasture set aside in the spring time, from which 100 tons of green herbage containing 80 tons of water and 20 tons of dry matter could be collected. This material might be made into 75 tons of silage containing 58 tons of water and 17 tons of dry matter, or into 20 tons of hay made up of 3 tons of water and 17 tons of dry matter. The difference in weight between the original herbage and the silage and hay is due mainly to loss of water, but also to the disappearance of some solid matter as a result of chemical action. In the particular case cited, in which the wastage of dry matter is 15 per cent. in each process, the 70 tons of silage would have about the same feeding value as the 20 tons of hay, or, in other words, a ton of hay would be the equivalent of about 3½ tons of silage. Actually, the position is not quite as simple as the facts set out might lead one to believe, as there are changes in the digestibility of the various constituents during ensilage and haymaking.

A hillside silo on Mr. F. E. White's property. Note drainage from the silage.

Estimates of the cost of making silage range from about 3s. to 10s. per ton, whereas pressed meadow hay is said to cost somewhere in the region of 20s. to 25s. per ton under favorable conditions. If one accepts as a basis 25s. per ton for hay and 3½ tons of silage being its equivalent in feeding value, then silage would have to be produced for less than 7s. 1d. per ton to justify its production in preference to pressed hay on the basis of cost. In addition to the cost of production, there is

also an added charge in the feeding out of silage which may or may not be offset by the special value placed on its succulence.

The costs of making either hay or silage will naturally depend very largely on the class of machinery available and, if bulk handling is undertaken, then obviously a cheaper product could be turned out. One could, perhaps, make silage cheaper than hay by using more modern methods for making silage and slower methods for haymaking, while the position could easily be reversed if other methods were used. It will be obvious that one could make a case either way by a slight modification of production costs, and there does not seem to be a great amount of difference between the two from this point of view, provided similar facilities are available for the production of either.

A large reserve of baled clover hay on Mr. F. E. White's property.

At the present time a most important factor is the scarcity of labour on all farms, and this will make it extremely difficult to undertake conservation, particularly the ensiling of a large quantity of green herbage. Therefore, in places where haymaking does not occasion undue risks, it would seem preferable to make hay the main reserve.

On the dairy farm some silage would be an advantage as milking cows relish succulent material during the summer, while the spreading out of the labour involved in harvesting due to the fact that cutting for silage can be commenced at least a month before haymaking could be undertaken, is of importance to the farmer who has limited time available between milkings.

Coarse, stemmy and weedy material is better ensiled than made into hay, as the pickling process softens the stems and the early cutting militates against the formation of germinable seed. It should be appreciated, however, that a fodder with a high nutritive value cannot be obtained from material of low-feeding value merely because it undergoes ensilage, which, after all, is merely a process of preservation, and one that occasions a loss of nutrient material.

Several pits of silage were seen during the inspection of fodder, but only at one place had any provision been made for the liquid to drain away from the mass. Ordinarily, if the pit is well sealed at the top and sides, the loss of dissolved nutrient in the drainage liquor does not amount to more than 1 per cent., and the silage becomes sweeter in consequence of the removal of the excess liquid, but if the pit has not been topped up sufficiently and water is able to collect on the top, drain down through the silage and run out at the bottom, then a continuous loss of nutrient can occur. It is important, therefore, when filling a trench or pit silo, to top up several times and finish with a high crown covered with earth to shed the water.

In general, the hillside silo is the most convenient, but failing this a trench cut through a knoll makes a good silo. If drainage cannot be undertaken, then a bed of old straw or poor-quality hay put down before filling will serve to soak up some of the liquid, and this material can be fed out to stock when the pit is emptied.

The Entries.

In any fodder competition, there is always a difficulty in comparing farms that are quite different in character. Usually, the main obstacle is to bring the grazier into line with the dairy farmer, but the Benalla competition presented a further difficulty in that one competitor had a considerable area of country on the flats at Swanpool, where ordinarily conditions during the summer are conducive to growth, and little, if any, hand feeding is necessary at this time of the year. In effect, this means that a lower reserve of fodder is needed on this type of country than, say, on

the drier country nearer Benalla. Although the competitor was given the full ten points for green crops, this did not materially offset the low allocation for the quantity of fodder on hand.

The winner of the competition this year was Mr. A. T. James, of Warrenbayne. This competitor has figured prominently in competitions in the past, and it is very pleasing to note that after being runner up in 1937 and 1939, Mr. James has succeeded in taking first place. Some idea of the carrying capacity of the Warrenbayne country can be gained from the fact that on 565 acres Mr. James carried 450 breeding ewes, 220 dry sheep, 30 milkers, 41 young stock, 2 bulls, and 3 working horses. Fodder on hand included over 4,000 bales of pressed hay housed in sheds, consisting mostly of first quality rye grass and subterranean clover, a stack of oaten hay well protected against mice and weather damage, a small quantity of oaten chaff, and approximately 300 tons of silage made from *Phalaris tuberosa*, perennial rye grass, and subterranean clover.

The quality of the fodder reserves reflects very well the excellent type of pasture on Mr. James' property, where pasture improvement has been carried out for a number of years. A point of particular interest on this farm was the method used to introduce perennial rye into subterranean clover pastures. A springtooth cultivator with narrow points is run over the paddock each way when the subterranean clover is at the primary leaf stage, and then 4 lb. of perennial rye grass is sown with the drill with the harrows attached behind it to give the seed some cover. The inclusion of perennial rye grass in the pastures is a decided advantage, as it gives more balance to the feed and provides a green pick in the early autumn before the subterranean clover gets away. It was very noticeable that much of the pasture hay submitted by contestants in this competition contained little or no rye grass, and in some cases had quite a lot of barley grass, silver grass, fog grass, and other inferior species. The introduction of suitable species of grass into pastures of subterranean clover is the second phase of pasture improvement, and the method of top sowing as practised by Mr. James is generally applicable. In places where soil moisture during the summer is likely to be insufficient for the maintenance of perennial rye grass, then *Phalaris tuberosa* or Wimmera rye grass would be suitable alternatives.

Mr. F. E. White, on an adjoining property, gained second place with a large reserve of baled clover hay of good quality, some loose hay, and two pits of pasture silage containing first class material. Fodder per stock unit was a little less on this farm than on Mr. James' property, but otherwise the allocation of points was very similar.

Third place was gained by Mr. G. Grimwade, of Benalla. In addition to baled meadow and lucerne hay and silage, this competitor had a large grain silo containing about 50 tons of oats.

Considering the fact that most of Mr. Grimwade's stock were sheep, he did very well to gain such high points in a competition that requires approximately 3 cwt. of fodder for each mature sheep. On this property there was a silage pit containing about 300 tons of silage, which no doubt will prove invaluable in a time of scarcity.

FODDER CONSERVATION COMPETITION AT BENALLA, 1941–42.

Name.	Quantity and Quality. (80.)	Green Crops. (10.)	Quantity in Excess. (60.)	Suitability. (15.)	Condition of stock. (10.)	Location. (10.)	Protection. (15.)	Total. (200.)
1. A. T. James, Warrenbayne ..	80	2	9	15	10	10	15	141
2. F. E. White, Warrenbayne ..	73	2	..	15	10	10	15	125
3. G. Grimwade, Benalla ..	64	10	..	15	10	10	15	124
4. R. T. Hill, Molyullah ..	28	2	..	13	10	10	15	78
5. A. Heeney, Swanpool ..	14	10	..	15	10	10	15	74

Rabbit Skins

Skinning—Stretching—Storing

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

AS rabbits are particularly destructive to most crops, including pasture, and compete with farm animals for feed, their control is essential in the interests of farming. The control of rabbits is administered by the Vermin and Noxious Weeds Branch of the Lands Department, and land holders are expected to co-operate with district inspectors in this respect. It is obligatory on farmers and other land holders to keep rabbits down on their properties, but when rabbit skins and rabbit carcasses are selling well, it is possible to make the rabbits pay for their own destruction.

Rabbits are classed as vermin, therefore many land holders do not always catch them in a systematic way nor realize that their skins are often very valuable. Rabbiting is often left to the boys who are allowed to keep the revenue from skins as pocket money. Last winter, numerous farmers reported making as much as £30 per month from rabbit skins caught as a side-line to their other farming activities.

This brief article is written to give some idea of the best way to skin the rabbits, and stretch and store the skins so that the amateur may obtain the best price possible for them.

Classes of Rabbit Skins.

Rabbit skins are classed into Pelts, Winters, Incomings, Autumns, Three-quarter Growns, Half-growns, Racks, Does, and Kittens. These classes are usually split into two to six subclasses or grades, such as 1st Pelts, 2nd Pelts, &c. It should be remembered that a border line skin properly skinned, stretched, and stored will go usually into the higher class, whereas the badly stretched one will go into the lower class which may be several pence per pound cheaper.

In addition to the above classes, there are butchered and damaged skins. Butchered skins are from gutted rabbits, whereas damaged skins have been torn, or are badly stretched, blood stained, weevilly, mouldy, &c. Butchered skins are classed into butchered pelts, winters, &c., but damaged skins are classed as 1st damaged, 2nd damaged, and so on. As damaged skins comprise a very large proportion of the skins received, and as most of the damage is caused by neglectful skinning, stretching, or storing, much money is unnecessarily lost as a result. Blood stains from shooting and poisoning are usually sufficient to put the skins into damaged classes. Nevertheless it still pays to skin and stretch such skins properly.

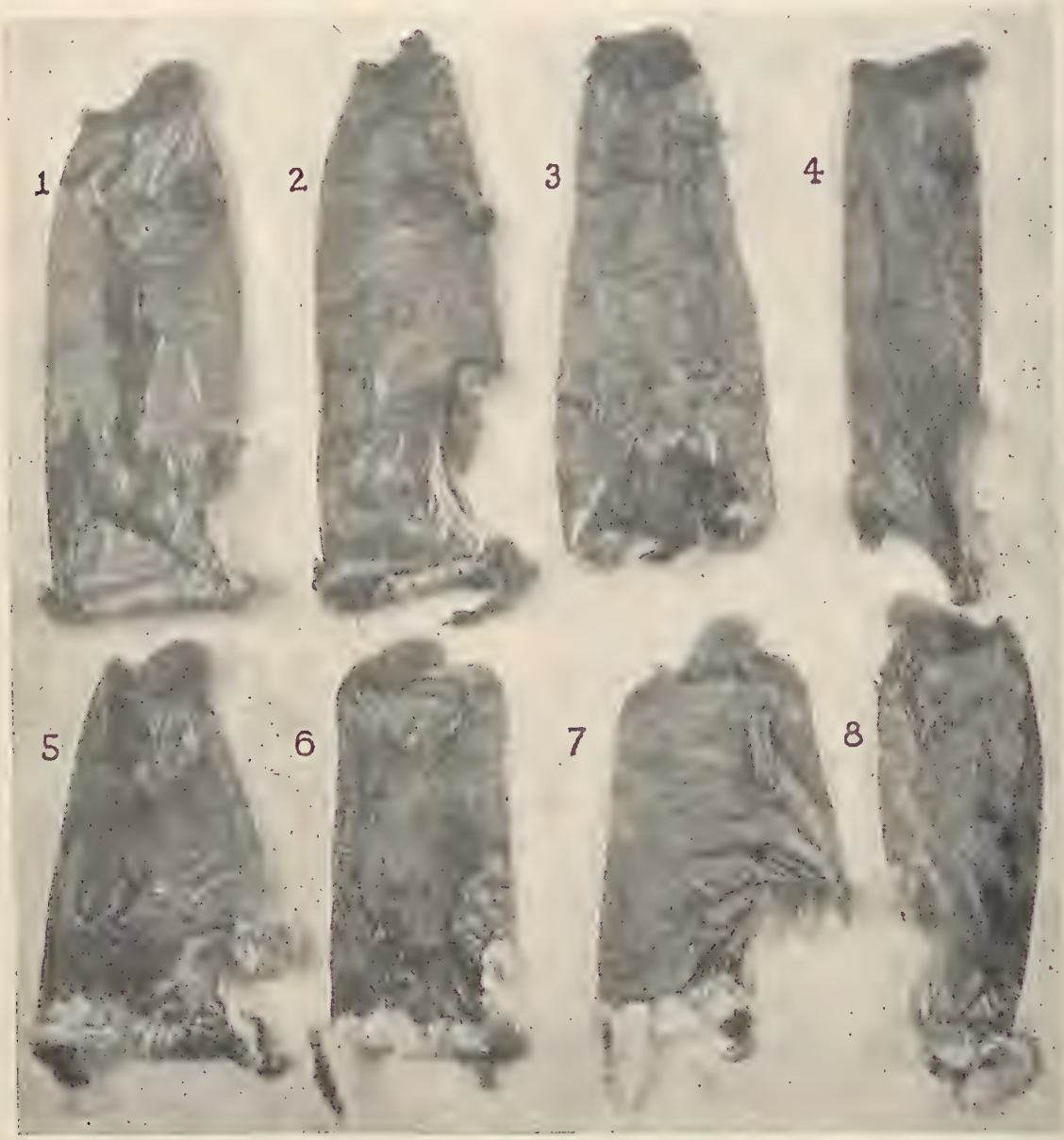
Skinning.

Skins should be sleeved. This is done by cutting the skin down the inside of both hind legs to the crutch just under the tail, with a sharp pointed or skinning knife. The skin is then carefully removed by the hands and fingers, firstly by taking it from the hind legs and as far down to the toes as possible to allow the legs to be tied easily and securely round the wire on which the skin is stretched. The skin is then pulled over the carcass, turning inside out in the process. The front legs are pulled out and the skin cut off behind the ears. Care should be taken that the skin is not torn anywhere in the process. The most common places to tear it are at the navel and front legs. If torn, the skin immediately becomes damaged. The heads should not be skinned.

Stretching.

The skin should be stretched on a well-shaped wire made from a straight piece of No. 8 gauge wire, galvanized for preference. The wire should be at least 3 feet long. When the wire is bent, the ends should be at least 12 inches apart, so that there will be sufficient spring in the wire to stretch the skin properly. A well stretched skin from a full grown rabbit should be about 6½ inches wide and 16 inches long.

A wire and a well stretched skin are shown in the accompanying photograph. Care should



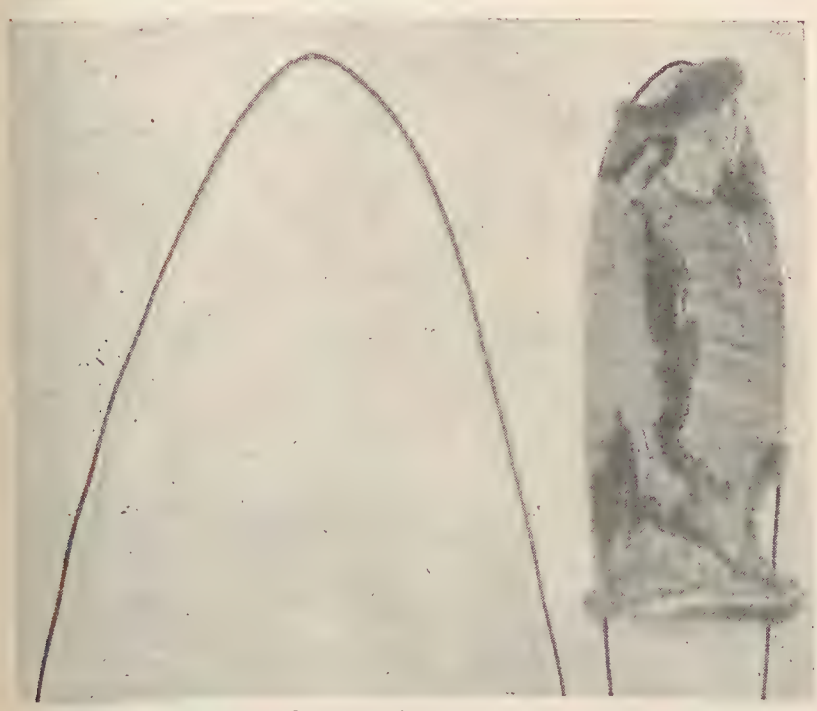
1.—A well-stretched Skin. The remaining skins have been damaged by—2, careless crutch gutting; 3, use of old method of stretching; 4, use of narrow wire; 5, not being fully stretched; 6, stretching on badly-shaped wire; 7, legs being left untied and use of badly-shaped wire; 8, by use of badly-shaped wire, crutch gutting, and leaving legs too short to tie properly.

be taken when making the wires to see that they are the correct shape and size. Before bending, the wire should be straight and free of kinks. Smaller wires are required for kittens' skins, whereas hare skins should be stretched on larger ones.

The skin should be placed carefully on the wire so that the centre of the back touches one side of the wire and the centre of the belly the other. The skin is kept in position by tying the hind legs together as shown in the illustration on the following page.

Wrongly and Badly Stretched Skins.

A visit to a fur store will show that thousands of rabbit skins are badly stretched. Many of the skins have been stretched on badly made wires. The wires are frequently



A well-shaped wire and a properly-stretched skin.

too narrow, too pointed at the top, or too square at the top. All wires should be regularly examined and bent into the right shape. Small wires should be set aside and used only for kittens. In the illustration samples of badly stretched skins are shown and the reasons for the bad stretching are given. A well stretched skin is shown also for comparison.

The disadvantages of stretching skins the "old way," that is, by tying the rear legs in front of the skin, are that grease runs off the belly skin on to the good back fur, which is exposed where the legs are tied, and also that the skin is harder to cut open as it is more difficult to run a knife straight up the centre of the belly than when the skin is folded along the centre of the belly as in the modern method.

Drying.

Rabbit skins should be dried on the wire, under cover from direct sunshine, damp weather, cats, dogs, rats and other vermin.

Storing.

When thoroughly dry, skins should be stored in a dry place away from rats, mice, and weevils. No skins should be packed away or consigned unless thoroughly dry. Weevils can be controlled by spraying or painting the skins with sodium arsenate solution, made by mixing 1 lb. of sodium arsenate in 4 gallons of water. This solution is poisonous and should be stored away from children and farm animals. Once properly sprayed or painted, the skins will always be free of weevils. Weevils also may be destroyed by fumigating skins with carbon disulphide. The skins should be put into an airtight container or drum with a tight fitting lid or damp bag over the top. A small open bottle of carbon disulphide may then be placed amongst the skins. The carbon disulphide evaporates, penetrates the skins, and poisons the weevil grubs, pupae or crysalids, and beetles, but not the eggs. These may be destroyed by a second fumigation. Skins so treated are liable to become re-infested.

Skins should not be kept too long, but sold as frequently as possible. Old skins become stained and stale looking, and may be classed as damaged. Furthermore, buyers prefer fresh skins, caught during the current season. The demand for winter skins is towards the end of the winter. It seldom pays to keep skins and sell them out of season.

Skins always should be sold through reliable agents or to reputable skin buyers.

Uses of Rabbit Skins.

Practically all of the damaged skins, kittens, does, and summer racks are purchased by hatters for the manufacture of felt hats. The three-quarter and half-grown skins and portion of the racks are usually purchased by furriers for the manufacture of fur linings for gloves, boots, caps, and other clothing. The pelt, winter, incoming, autumn, and occasionally rack skins are usually purchased by furriers for the manufacture of fur (coney) coats and other fur garments.

About 85 per cent. of rabbit skins are at present being purchased at high prices by United States buyers, and this is providing Australia

[*Continued on page 262.*

Potato Seed Certification

By J. T. RAMSAY, Potato Expert

A section of the visitors to the Warrenheip Field Day, 12th March, 1942. [*Leader photo.*

IN Victoria the establishment of a seed certification scheme for potatoes was authorized in December, 1938.

The object of the scheme was to make an effort to raise the standard of potato growing in Victoria by—

1. Eliminating as far as practicable the damage caused by disease, thereby increasing yields of sound potatoes.
2. Securing greater varietal purity.
3. Giving seed buyers some guarantee that they were supplied with the variety and grade of potato seed required, with a reasonable assurance that such seed was comparatively free from hereditary diseases.

At planting time, growers desiring to enter their crops for certification must apply to the Department of Agriculture, stating acreage, varieties, and date of planting. A fee of 10s. as an earnest of good faith is required with the application.

It is advisable, where such information can be given, that the source of seed, disease control treatment, manuring, and the previous crop sown on the land planted to potatoes should be given.

Crops accepted are examined twice in the field when growing. The first inspection is made approximately four to five weeks from the date of planting, and the second at flowering time. Should there be any evidence at the first inspection of disease symptoms on the plants, the grower is shown how to recognize same, and asked to rogue the affected plants from the crop. If, at this stage, the crop shows a high degree of infestation it is rejected forthwith.

The main transmissible diseases recognizable at this early examination are:—

1. Virus diseases (mild and severe mosaic, crinkle, and leaf roll.
2. Rhizoctonia (collar stem rot).
3. Blackleg (due to bacteria).

If at this examination the crop does not show more than, say, 3 or 4 per cent. of plants affected by these diseases, it can be raised to certification standard by eliminating the affected plants.

The second inspection, at flowering time, will show whether any rogueing done previously has been effective, and also gives excellent opportunity to determine varietal purity. Varietal purity should be 100 per cent. Should the crop pass the second examination it is approved subject to a final inspection when bagged ready for despatch. This final inspection is made to ensure that grading has been done according to the standard demanded by the scheme.

Several grades may be made. These are as follow:—

1. Seed size for planting whole.
2. Medium size, to cut two to three sets.
3. Large, to cut more than three sets.
4. The run of the crop from 1½ inches upward.

To secure certification in all grades it is necessary that a uniform and attractive parcel be made, free from blemishes and rough shaped or coarse tubers. For the current season 1941-42, 50 growers entered just over 500 acres of potatoes to be tested for certification.

At present about 360 acres of seed potatoes have qualified, subject to examination after grading has been completed.

It should be noted that not all of the 140 acres of seed potatoes which failed to qualify were complete rejects, because many of them just failed to pass.

The high percentage of potatoes falling short of the standard required for qualification emphasizes the high quality of crop demanded for certification. To reduce the standard would be to defeat the purpose of the whole scheme.

The value of certified seed is being recognized particularly by growers, such as market gardeners, who purchase fresh seed every year, and growers who require stock of sound constitution, without waiting for years to work up their own strains.

Tests have been conducted by the Department between certified seed strains and those held, in some districts for years, without having been given any selective treatment. The improvement in yield and sample in favour of certified seed was appreciable in all cases, and in some instances the difference was considerable. The higher cost of certified seed is amply warranted by the extra cost involved in its production, and justified by the better results ensured by its use.

In the accompanying illustration of crops from certified and ordinary run of seed, taken at the field day on the Warrenheip experimental plots, 12th March, 1942, the difference between the crops grown from certified and uncertified seed respectively is clearly shown.

The difference between crops grown from certified and uncertified seed respectively is clearly shown in the picture. [*Leader photo.*

In the test between the two classes of seed, all conditions, viz., soil, manuring, and cultivation were equal.

In the appended list of growers and varieties of potatoes which have qualified so far this season, it will be noted that the "Carmans" hold pride of place in numbers, with "Up to Date" second. The "Carmans"—early maturing and late maturing—for many years have been favoured by Victorian growers and consumers, but of late years the "Carmans" of American origin have shown a high degree of susceptibility to "virus" disease, and, with the exception of those cases where selection has been practised, they have shown a progressive reduction in productive capacity. "Up to Date," produced by the noted Scottish raiser, Findlay of Markinch, has probably been in the front rank as a cropper and public favourite for an equal length of time, but it, too, has fallen prey to virus attack.

Curiously enough, the particular form of virus which affects the "Carmans" is different from that causing reduction in yield in the "Up to Date." "Carmans" are susceptible to the "mosiac" type of virus, while "leaf roll" finds a suitable host in "Up to Date." Of the other two varieties listed, "Snowflake" is an old variety still much favoured by growers in the Ballarat district. This variety is very resistant to virus diseases. "Katahdin," a comparatively recent importation from America, has so far shown itself to be, for all practical purposes, almost immune from virus attack, and is a great cropper. It promises to take a very prominent place in Victorian potato production, both from the growers' and consumers' points of view.

In view of the increased demand for certified seed and the urgent need for greater production, only the best quality seed should be planted.

It is advisable that growers should order their requirements from certified seed growers as early as possible owing to the keen demand expected.

List of Growers of Certified Seed Potatoes, 1942.

Up-to-Dates.

Deppeler Bros.	Beech Forest.
J. Perry	Beech Forest.
F. Bellchambers	Beech Forest.
A. J. Towers	Beech Forest.
W. J. P. Congram	Beech Forest.
J. Knox	Wecaproinah.
W. H. Tann	Wecaproinah.
E. A. Minchinton	Wecaproinah.
S. Webster	Lavers Hill.
A. G. Barker	Wecaproinah.

Katahdin.

A. W. Giles	Koo-wee-rup.

Snowflakes.

John Collery	Kerrie, via Romsey.

Early Carman.

Auchterlonie Bros	Narracan.
Powell & Sons	Narracan.
L. C. Mayo	Thorpdale.
Cromb & Wilcox	Millgrove.
Jas. Collery	Kerrie, via Romsey.
W. A. Maskell	Romsey.
V. Wilson	Neerim Junction.
J. Knox	Wecaproinah.

Late Carman.

E. J. Emmott	Merricks.
D. J. Toohey	Kinglake Central.
J. Toohey	Kinglake Central.
Exton & Sons	Kinglake Central.
F. C. Owen	Kinglake Central.
Easdown Bros.	Kinglake.
F. Bellchambers	Beech Forest.
A. J. Towers	Beech Forest.
W. J. P. Congram	Beech Forest.
J. Knox	Wecaproinah.
W. H. Tann	Wecaproinah.
A. Exton	Kinglake Central.
E. T. Hawkins	Kinglake.
R. & W. Dow	Ferguson.
Dow Bros.	Ferguson.
J. Else	Kerrie, via Romsey.
W. A. Maskell	Romsey.
V. Wilson	Neerim Junction.
J. Butler	Wecaproinah.
E. A. Minchinton	Wecaproinah.
F. J. Owen & Sons	Kinglake Central.

DO YOUR BIT! BUY WAR SAVINGS CERTIFICATES

In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Odd Jobs in the Orchard.

HAVING completed the main apple harvest, except for a few late varieties —Yates, Democrat, and Rokewoods— fruitgrowers should have some spare time during this month to attend to the various odd jobs which accumulate throughout the year. It is a good plan at this stage to look around the orchard with a critical eye and take stock of material and equipment in need of repairs. Picking ladders, for instance, which have served their purpose for the present, but will be required again for pruning, frequently require attention. Picking bags, cases, lug boxes, and buckets should be stored away in a dry place after making sure that they are in a good state of repair. The present shortage of cases makes it even more desirable to care for picking boxes on the orchard.

Codling Moth.

It is necessary to stress the fact that picking boxes may become a serious source of codling moth infestation if left out in the orchard. The taking apart of an old box would be enlightening in this respect. Instances have been recorded in which 30 or 40 cocoons have been found hidden in one case. If possible, boxes should be stacked away in a shed, made moth-proof by means of fly-wire doors and windows; or where growers have a private cool store, an unused chamber makes an ideal situation for storage.

On many orchards in the past season, severe losses of apples were caused by the codling moth, and large quantities of infected fruit remain on the ground, around the trees. As the grubs have probably left the fruit, it would hardly be worth while collecting windfalls at this time of the year. However, every effort should be made to attack over-wintering larvae in cracks in the bark of the trees if either bag or chemical bandages were not applied. Evidence has accumulated over the past few years that inadequate control measures have resulted in large moth populations being built up on some orchards. Sanitation measures, therefore, assume an even greater importance, and every grower should devote as much time as possible to scraping the butts of trees and filling in cracks or scars in the branches.

Pruning.

Because of the labour shortage, many growers will commence pruning this month. A start may be made on plums, peaches, and cherries, which usually lose their leaves earlier than apples and pears.

Spraying Apricot Trees.

For the control of Apricot Shot-hole and Scab, an application of Bordeaux mixture—6:4:40—should be given to the trees when the leaves are falling. This spray is important, because it prevents the germination of spores which lodge in the bud scales. It is claimed also that this spray has some controlling effect on Apricot Freckle.

Drainage.

The value of drainage is apparent on most properties where tile drains have been laid. It has been noticed, however, that in certain instances, drains have ceased to function because of siltation, or the tiles may have shifted by the penetration of roots. As drainage is fairly expensive, some care should be taken to see that full value is being obtained from the money so invested. It is therefore a wise plan to inspect the outfall of the drains after a heavy rain. Time spent in attention to these details will be well repaid in increased health of the trees.

Navel Oranges.

Early navel oranges will be harvested during the month, and growers should endeavour to pick fruit which is of the required maturity standard and juice content. Only large-sized oranges, which are more mature, should be picked, so that smaller fruit will develop more quickly. Fruit should be handled carefully to prevent rind injury and subsequent loss from decay. Any growers who require supplies of bud wood should keep on the lookout for limbs bearing fruit of superior quality as they are picking. Navel oranges frequently produce limbs bearing fruit of inferior quality; therefore, to make sure that satisfactory bud wood shall be obtained, limbs bearing good fruit should be conspicuously marked.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

Roses.

HOME gardeners who intend to plant roses this winter should prepare their lists of varieties early, and place their orders with the nurseryman. This will obviate disappointment, and substitution of other less desirable varieties. Colour and fragrance are two of the most desirable characteristics required of the rose. The deep red and crimson roses are always popular, and the following varieties, either as standards or bushes, will give every satisfaction:—

Crimson Glory.—A beautiful, deep-crimson rose, with large well-formed fragrant buds of velvety texture.

Chateau de Clos Vougeot.—Double flowers, red, deeply-shaded black and scarlet. One of the most fragrant roses, although not a strong grower. The climbing form of this variety is very popular.

Daily Mail Scented.—Flowers are of good form, deep-red to scarlet, and very fragrant. This variety is a good grower.

Etoile de Hollande.—A well-formed rose of dark-red colour, and fragrant. It is a vigorous grower and flowers freely.

General MacArthur. — A sweetly-scented, free-flowering scarlet variety, named after the present General Douglas MacArthur's father.

George Dickson.—Produces dark-red velvet blooms of good shape and very fragrant. A vigorous grower.

Hadley.—A rich, crimson-red of good form, and sweetly scented. A very good bedding rose and a vigorous grower.

William Orr.—Deep velvety crimson, the backs of the petals being lighter; sweetly perfumed, has well-formed buds, with healthy, vigorous foliage and growth.

President Boone.—Large, deep velvety crimson fragrant blooms.

Of the dark-red climbing roses, the most popular are Blackboy, Climbing Chateau de Clos Vougeot, Climbing Etoile de Hollande, Climbing Daily Mail Scented, and Miss Marion Manifold.

Lilies.

It is not too late to plant lily bulbs. These flowers bloom from November to March, according to the variety. Some varities are quite hardy, and can be grown to perfection in the suburban garden if their requirements are understood. Most lilies are stem-rooted, i.e., the base of the stem above the bulb sends out numerous feeding roots, in addition to the roots produced on the base of the bulb. These stem-rooting varities need deep planting, and 6 to 9 inches is usual. All lilies require good drainage, and grow best in soils containing plenty of well-decayed organic matter. Some, like *Lilium auratum,* do not like lime, while others will tolerate lime in moderate amounts. They all enjoy a cool soil for their bulbs and roots, and many varieties must grow in partial shade if the best results are to be obtained.

The soil can be kept cool by a heavy mulch of well-decayed leaf mould, or by a thick planting of annuals, or small perennials and shrubs, over or near the lilies to shade the soil during the summer. When preparing the soil for lilies, dig in plenty of leaf mould and plant the bulbs in a few handfuls of sharp sand. Of the upright, bright-orange flowering types—*Lilium croceum, Lilium dauricum, Lilium elegans,* and *Lilium umbellatum* are popular, and flower from November to January.

A very hardy lily, and one of the first to bloom in November, is *Lilium candidum*—the Madonna Lily. This lily, with its pure white, trumpet-shaped flowers, can be planted about 3 to 4 inches deep, because it is not a stem-rooting type. It will tolerate lime. Other white flowering trumpet-shaped varieties are *Lilium philippinense, Lilium longiflorum*—the Christmas Lily, and *Lilium regale,* which is one of the finest lilies.

Another group of lilies has red, orange, and yellow nodding flowers with reflexed petals. The most popular member of this group is the Tiger Lily (*Lilium tigrinum*), closely followed in popularity by *Lilium Henryii, Lilium pardalinum,* and *Lilium speciosum.* All of these are fine lilies which should be tried in the garden. *Lilium tigrinum* var. *splendens* is an improvement on the original Tiger Lily. *L. speciosum* dislikes lime.

THE VEGETABLE GARDEN.

Onions.

This year many gardeners will be growing onions for the first time, and a few cultural hints on the crop may be useful. The onion requires cool moist conditions for early growth, hence seed is sown during late summer, autumn, and winter according to the variety. Seed of the so-called "Odourless" can be sown in May for planting out at the end of July and in August. White Queen, Silverskin, and Early Barletta are similar types which can be transplanted during May. Before planting, dig in plenty of well-decayed organic matter, as the onion enjoys a moisture-retentive soil. An application of lime at the rate of 3 to 6 oz. per square yard is usually beneficial.

Sow the seed from half to three-quarters of an inch deep. Always use fresh seed, because the onion seed loses its vitality very quickly. When transplanting, which should be done when the plants are about the thickness of a lead pencil, the roots and tops are trimmed back. About half to three-quarters of an inch length of roots should be allowed to remain and about one-third of the tops removed. Plant in rows 10 to 12 inches apart and 4 to 6 inches between the plants. Keep the soil free from weeds by constant and shallow cultivation. Constant cultivation is necessary, otherwise the weeds compete seriously with this shallow-rooting crop, which requires very shallow cultivation. The removal of large weeds disturbs the root system and checks the growth of the onions. A fertilizer application of 1 part of sulphate of ammonia and 2 parts of superphosphate at the rate of at least 4 ounces per square yard will be found beneficial if applied once or twice during the crop's early growth.

Bulb formation in the onion does not commence until the days begin to lengthen, although a recently introduced onion called Early Grano does commence development of the bulb under short-day conditions. After the bulbs are well formed the process of further development can be accelerated by bending the tops over. This appears to check any further leaf development, and causes a rapid swelling and maturing of the bulb.

Ascochyta Blight of Field and Garden Peas

By L. L. STUBBS, B.Agr.Sc., Assistant Plant Pathologist

ASCOCHYTA blight is a major disease of peas in this State.

The term Ascochyta blight is used in a wide sense in overseas literature, and refers to the somewhat similar foliage symptoms caused by three fungal parasites *Mycosphaerella pinodes* (Berk. and Blox.) Stone, *Ascochyta pinodella* Jones, and *Ascochyta pisi* Lib.

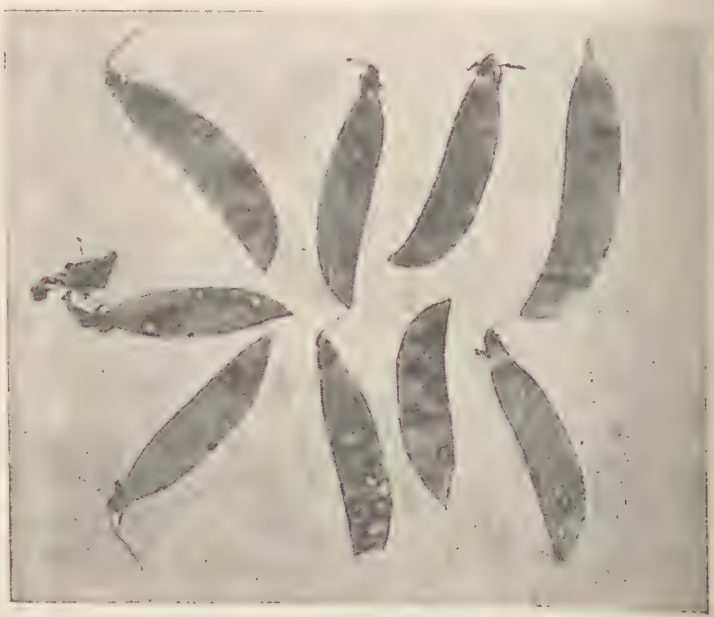


Fig. 1.—Disease lesions on pods infected with Ascochyta Pisi.

Symptoms.

Ascochyta pisi causes a leaf and pod spot which is of little economic importance and, in order to prevent confusion with the more serious phase of Ascochyta blight, the symptoms of this disease will be described under the following heading:—

Ascochyta Leaf and Pod Spot:—Sunken, tan-coloured spots with definite dark brown margins, circular on the leaves and elongate on the pods are produced on affected plants. Stem lesions, are rare and foot-rot does not occur. (Fig. 1.)

The disease symptoms produced by *Mycosphaerella pinodes*, are almost identical with those produced by *Ascochyta pinodella*. No attempt will be made to differentiate between the symptoms produced by the two organisms, because in the writer's opinion *Mycosphaerella pinodes* predominates in this State. *Mycosphaerella pinodes* was isolated consistently from stem, pod, and leaf lesions on diseased material which was photographed to illustrate Ascochyta blight in this article.

Future references to the term Ascochyta blight, will be directed entirely to the disease caused by *Mycosphaerella pinodes*.

Ascochyta Blight.

The disease is characterized by a black or purplish discolouration and streaking of the lower stem, together with a conspicuous spotting of the leaves and pods.

Severe infection of the lower stem may result in the development of stem or foot-rot with the subsequent death of the plant.

Leaf symptoms are of two types, one, with numerous small, irregular, dark coloured lesions, and the other with large, circular, zonate, brown spots which are much less abundant. (Fig. 2).

The coalescence of similar lesions on the pods results in the formation of large, irregular, sunken, purplish-black areas which may extend over the greater part of the pod surface.

Infected seeds may be recognized by the presence of brown or purplish-brown discolourations, which are usually more pronounced on those areas of the seed coat, which were adjacent to infected areas on the surface of the pod. (Fig. 3). Seeds may be infected, however, without exhibiting any external evidence visible to the naked eye.

Causal Organisms and Seasonal Activities.

The life histories of the previously mentioned causal organisms are essentially the same and for the purposes of this article they will be treated as a single entity.

Fig. 2.—Ascochyta Blight, caused by Mycosphaerella pinodes. Note two types of foliage lesions.

Dissemination of Disease.

A small number of minute, black, pimple-shaped bodies develops in lesions on the leaves, stems, and pods of infected plants. Fungal spores which are produced in these receptacles ooze out and are splashed from plant to plant by rain, thus enabling the spread of the disease throughout the crop.

Overwintering.

There are two methods of overwintering of the disease organisms:—

1. Fungal strands may grow through the pod and infect the seed by penetrating the seed coat. The fungis remains dormant until the seed is sown, when the presence of moisture enables it to develop on the young plant, thereby establishing an infection focus for the spread of the disease to surrounding healthy plants. (Fig. 3.)
2. The production of fruiting bodies on diseased refuse from a previous crop may also enable the spread of the disease.

Seasonal Influence.

Climatic conditions exercise a profound influence on the effect of Ascochyta blight. Moisture is absolutely essential for the spread and rapid development of the disease. In a dry season the planting of infected seed may not necessarily produce a badly infected crop, but the influence of wet conditions may produce 100 per cent. infection with heavy losses in stand and yield.

Apart from seasonal conditions, the time of sowing is another important factor influencing disease development. Winter sowings are almost invariably infected, while late spring sowings are frequently unaffected.

Thus, Ascochyta blight could be described as a potential menace almost entirely dependent upon high atmospheric and soil moisture and possibly low temperature conditions for its optimum pathogenicity.

Control.

All available control measures aim at the prevention of primary infection. After the occurrence of infection, disease development is controlled mainly by climatic factors.

1. *Use of Disease-Free Seed.*—The use of disease-free seed on land which has not grown peas for four or five years practically eliminates the possibility of disease in a crop. This is the main control measure recommended in the United States of America where disease-free seed is raised by seed-growing companies in the arid Rocky Mountain States. (1.)

   In the experience of the writer, most commercial samples of field and garden peas sold in this State are infected with one or more of the Ascochyta blight organisms.

   Growers in districts which have an annual rainfall of 25 inches or more are advised to refrain from the practice of saving their own seed unless they are certain that their crops are disease-free.
2. *Rotation.*—To minimize infection, growers should practice a rotation which includes peas, not oftener than once in three years, and, where farming practices permit, the rotation should be extended to four or five years.

3. *Late Sowings.*—Late, in preference to early, sowings are advised in those parts of the State which have sufficient spring and summer rainfall to enable the normal development of a pea crop.

Supplementary control measures involve the destruction of diseased crop refuse by burning or by ploughing under deeply if the former method is impracticable.

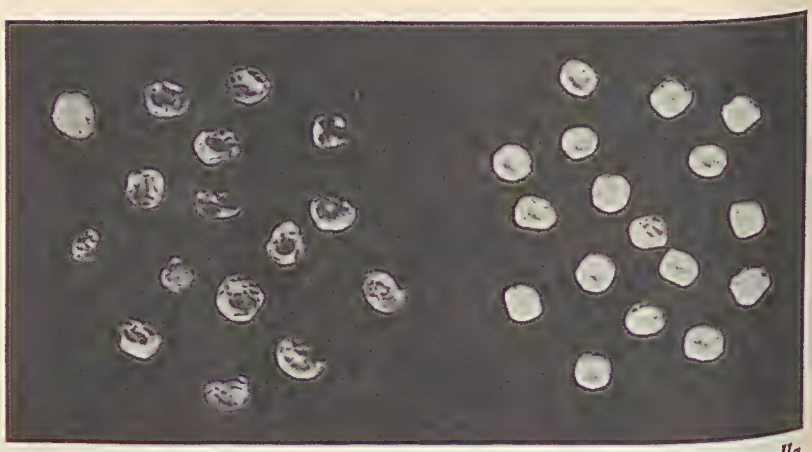


Fig. 3.—Left: Healthy seed. Right: Seed infected with Mycosphaerella pinodes.

Seed treatments are not advised as the organisms are carried within the seed coat, and, while it is claimed that some organic mercury dusts will lower the incidence of foot-rot, no seed treatments will prevent the fungi from developing on the above-ground parts of plants raised from infected seed. (2) (3.)

References:

(1) Harter, L. L.; Zaumeyer, W. J.; and Wade, B. L., 1931.—Pea Diseases and Their Control, U.S. Dept. Agr. Farmers Bull. No. 1735.

(2) Jones, Leon K., 1927.—Studies of the Nature and Control of Blight, Leaf and Pod Spot, and Foot-rot of Peas caused by species of Ascochyta. N.Y. Agr. Exp. Sta. Bull. No. 547.

(3) Jones, Leon K., 1931.—Factors Influencing the Effectiveness of Organic Mercury Dusts in Pea-Seed Treatment. J. Agr. Res., Vol. 42, No. 1, pp. 25–33.

JOIN OR FORM A WAR SAVINGS CERTIFICATE GROUP

RABBIT SKINS—*continued from page 253.*

with valuable credits in America for the purchase of war materials. During March, 1942, a record price of 104½d. per lb. was paid for Racks. This works out at £965 6s. 8d. per ton. It will be appreciated therefore that the rabbit, although regarded generally as vermin, has his virtues, inasmuch as he provides one of the most valuable exports from Australia to the United States of America at the present time.

Rabbit fur is also being used extensively in the manufacture of military hats and the skins are used widely as linings for gloves, boots, and other garments of servicemen.

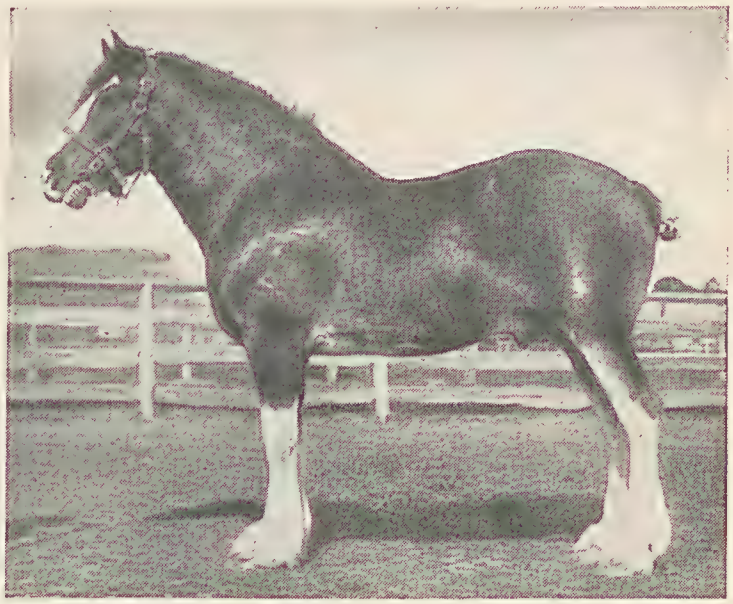
Rabbit Flesh.

In addition to their fur-bearing qualities, rabbits provide a good white wholesome meat for human consumption, and even when the price of a fresh large rabbit is as high as 1s. 6d., the meat is as cheap as any offering. Carcasses not required for human consumption make a splendid substitute for skim-milk or meat-meal in the rations of pigs and poultry.

Registration of Stallions

Twenty-second Annual Report

By
R. J. deC. TALBOT, B.V.Sc.,
Chief Veterinary Inspector



The slump which has taken place in the draught horse breeding industry since 1937 is of far greater significance than in normal times for, at present, economical production is essential, and the cost and availability of power on farms is of national importance. Whatever the causes have been, droughts, introduction of tractors, or low prices, it is a fact that, for the past five years, horse breeding has very materially decreased in this State, and unless the position improves the effect on primary production will, undoubtedly, be serious.

FARMERS using horses rather than power units are very materially assisting the war effort, and those farmers who are relying solely on tractors for their farm power would do well to take notice of a recent statement of the Minister of Commerce, in which he said that the time may not be far distant when restrictions on the use of power spirit will probably be as severe as those imposed on petrol users. With regard to the future, the Minister added that fuel for tractors may be difficult to obtain even after the war, because of the destruction of so many sources of Australian oil supply. In this case the demand for horses will undoubtedly increase, and if such a demand cannot be met the position of primary producers will be very serious.

Farmers, both from their own and from a national point of view, would be well advised to make every effort to breed some foals each year, because, in spite of the present depression, it may be stated confidently that the draught horse is destined to play an important part both in agriculture and commerce for many years to come.

Bonus for Foals.

As was stated in last year's report, the Government with a view to encouraging the breeding of the right type of draught horse, decided that a bonus of £2 would be paid to the owner of every foal which was the progeny of a registered draught stallion and a mare approved by the Chief Veterinary Inspector. To date the bonus has been paid in respect of over 1,000 foals, and the scheme should undoubtedly act as a stimulus to horse breeding.

For the year 1941-42, a total of 206 stallions was presented for examination, and of these 162 were registered. These figures are the lowest since the inception of the Act in 1920. The total number of stallions registered, and this includes the figure already mentioned above, together with those stallions over five years which are not required to be examined, was 975, comprising 629 draughts, 191 light horses, and 155 pony stallions.

The precentages of horses rejected, for both unsoundness and for type and conformation, were lower than they have been for many years, and may be considered satisfactory. The percentage of rejections for type and conformation in draught stallions (10·5 per cent.) is low, and although the number of stallions examined was small their quality was high.

With regard to unsoundness, the percentage of rejections in respect of all stallions examined was 9·7 per cent., the lowest figure since 1931.

Examination of Mares.

Breeders are reminded that, under a voluntary scheme, stud book mares may be submitted for examination for soundness. A fee of £1 is charged for the examination, and certificates for soundness are issued for three-year olds and for four-year olds, and life certificates for mares over five years. In the past many owners have availed themselves of the opportunity of having their mares examined, and it is hoped that during the coming season all stud breeders will present at least some of their mares for examination.

Two-Year-Old Colts.

In 1939, the Horse Breeding Act was amended to provide for the registration of two-year old colts whose owners desired to give them some stud service. The amendment provides that owners must make application for registration on the prescribed form, and the application must be accompanied by a fee of £1. The colt must be submitted for examination at a scheduled parade and, if passed, will be registered as a colt for one year. During the season 1941-42, thirteen colts were submitted for examination and all were registered.

Appeals.

No appeals were lodged against the decisions of the examining veterinary officers for the season under review.

LIST OF UNREGISTERED STALLIONS RETAINED BY OWNERS FOR USE WITH THEIR OWN MARES.

Under the provisions of the Horse Breeding Act the owner of any stallion, the registration of which has been refused, may, on payment of a fee of £1 per annum, and notification to the Chief Veterinary Inspector, retain such stallion for breeding purposes with his own mares only.

Name.	Age* and Class.	Owner and Address.
Unnamed	A. L.	M. Cole, Kooreh
Unnamed	A. P.	O. G. Hobson, Yarram
Unnamed	A. P.	Miss G. Small, Ferntree Gully
Alto Bells	A. P.	J. Barty, Redesdale
Barney Baron Belmont	A. D.	A. T. Cole, Wodonga
Baron Bold	A. D.	Mrs. D. A. Daly, Detpa
Bell Boy	A. T.	A. G. Turnbull, Coleraine
Benambra	A. D.	Nankervis Bros., Corryong
Ben Bowyang	A. D.	S. J. Wilson, Nar Nar Goon
Black Baron	A. D.	A. E. Tucker, St. Arnaud
Black Star	A. L.	D. Madill, Koyuga South
Bloomfield Talisman	4 D.	J. C. Thornton, Waaia
Bowler	A. D.	A. C. Masters, Corryong
Clan MacKenzie	A. D.	J. Purdie, Wunghnu
Clyde	A. D.	G. Thomson, Kilcunda
Craigie Master Stroke	4 D.	E. Roberts, Lake Rowan
Dandy Bell	A. L.	H. L. Spice, Bacchus Marsh
Dandy Boy	5 L.	W. Meagher, Danyo
Douglas	A. D.	J. A. McDonald, Gre Gre Central
Drummer	A. D.	F. Bird, junr., Yarram
Ethelldale Scotsman	6 D.	H. Kramer, Lawloit
Fifeness Flash Baron	A. D.	H. L. Treasure, Stratford
Flash	4 P.	A. F. Sanders, Sale
Flash Direct	A. L.	C. T. Evans, Rathscar
Forest Dale Flash Repence	3 D.	E. F. Arthur, Wail
Forest Dale Remark	4 D.	E. F. Arthur, Wail
Glencraigs Jubilee	3 D.	R. B. McKenzie, Timboon
Glen George	5 D.	G. Peters, Tallandoon
Glen McBride	A. D.	H. Jager, Swan Hill
Grampians Favourite	A. D.	J. Whiting, Terang
Haboob	5 P.	J. Crozier, Casterton
Huonson	A. L.	W. Marke, Girgarre East
John McElwyn	A. P.	D. Bamford, Becac
Kawaran Liston Craig	A. D.	V. O. Frost, Netherby
Keayang	A. D.	Jas. Blain, Dixie
Lord Roberts	A. D.	R. Wight, Woodside
Lord Victor	A. D.	J. Montgomery, Milawa
Mallee King	5 D.	S. Pearce, Woomelang
Manya Thrill	4 L.	E. Wheeler, Manya North
Model	5 D.	G. Wilson, Timboon
Noble	A. D.	E. Crowe, Tatong
Pete	A. P.	J. Knight, Goornong
Peter	4 D.	C. A. Deckert, Boinka
Pettadale's Pride	A. D.	D. Green, junr., Nullawil
Pride	4 D.	A. J. Chamberlain, Arnold
Prince	A. D.	F. J. Austin, Camperdown
Prince	A. D.	A. H. Fawson, Bairnsdale
Prince	A. D.	R. Estoppey, Briagolong
Prince's Prize	A. D.	Moran Bros., Cobden
Professor	6 P.	Exors. C. L. Forrest, Irrewarre
Punch	A. D.	J. Sansom, Bayles
Punch	A. D.	W. Earl, Woodside
Pyjamas	A. P.	Boyd Bros., Koroit
Rob Roy	A. P.	Miss E. A. Small, Hawthorn
Royal King	A. D.	D. Gorman, Crossley
Royal Mattie	A. D.	J. Kelson, Kirkstall
Royal Prince	6 D.	J. H. Crawford, Victoria Valley
Sailor	A. D.	A. G. Turnbull, Tyrendarra
Sam	A. D.	A. G. Turnbull, Tyrendarra
Scotland's Duke	A. D.	H. F. Quick, Brim
Silver	A. L.	H. B. and F. A. Birch, Tabberabbera
Sir Michael	A. D.	E. Lewis, Tatong
Sordino	A. T.	L. Matthews, Benambra
Sunset Trail	A. T.	Yarraberb Estate, Raywood
Surprise Power	A. P.	W. T. Jensen, Morwell
Tooronga George	4 D.	E. and J. Gooch, Wheatsheaf
Waldaira's King Knight	A. D.	Boyd Bros., Koroit
Walla Chimes	5 L.	J. Ohlin, Gooramadda
Warrangee Oswald	A. D.	Geo. Lord, Eskdale
Wee McGregor	6 P.	J. H. Waugh, Puckapunyal
Worawingeth Allenby	A. D.	W. T. Rowe, Wallinduc
Worthy Glen	A. D.	C. H. Heffernan, Iona
Young Toby	A. D.	W. J. Newton, Lower Cape Bridgewater

* NOTE.—Age in years. A., aged; D., draught; L., light; P., pony; T., thoroughbred.

Parades for the Coming Season.

Owing to petrol restrictions a schedule of stallion parades cannot be arranged for this season. Where possible arrangements will be made to examine stallions at centres most convenient to those owners from whom applications have been received. Applicants should state which main town would be most suitable for them to present their stallions for examination, and they will, in due course, be advised of date, time, and place of examination arranged.

It is felt that by such an arrangement, provided owners forward their applications by 1st July as is required, every stallion will be examined as early as in the past and without the slightest unnecessary inconvenience to owners.

Applications for registration must be made on the prescribed form before the 1st July, and must be accompanied by a fee of £3 (£1 for registration, and £2 compensation fee). The necessary forms may be obtained from the Chief Veterinary Inspector, Live Stock Division, Department of Agriculture, Melbourne, C.2.

Change of ownership must be notified without delay in order that certificates of registration may be endorsed accordingly. Registration expires within 30 days of change of ownership, unless the required notice is given.

SUMMARY OF EXAMINATIONS, 1941-42.

	Draught.		Light.		Pony.		Total.	
	Examined. 123.	Certificated. 94.	Examined. 49.	Certificated. 40.	Examined. 34.	Certificated. 28.	Examined. 206.	Certificated. 162.
	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.
Bog Spavin	..	..	..	..	..	..	..	..
Bone Spavin	1	·813	..	..	..	..	1	·485
Chorea (Nervy)	..	..	..	..	..	..	..	..
Curb	..	..	..	..	1	2·941	1	·485
Ringbone	..	..	1	2·040	..	..	1	·485
Sidebone	13	10·569	1	2·040	1	2·941	15	7·282
Stringhalt	2	1·626	..	..	..	..	2	·970
Thoroughpin	..	..	..	..	..	..	..	..
Through unsoundness	16	13·008	2	4·080	2	5·882	20	9·707
Through disapproval	13	10·569	7	14·286	4	11·764	24	11·647
Total	29	23·577	9	18·366	6	17·646	44	21·354

SUMMARY OF EXAMINATIONS, 1940-41.

	Draught.		Light.		Pony.		Total.	
	Examined. 149.	Certificated. 103.	Examined. 52.	Certificated. 40.	Examined. 42.	Certificated. 37.	Examined. 243.	Certificated. 180.
	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.	Rejected.	Percentage Rejected.
Bog Spavin	2	1·342	..	..	..	..	2	·823
Bone Spavin	..	..	..	..	..	..	..	..
Chorea (Nervy)	..	..	..	..	..	..	..	..
Curb	..	..	..	..	..	..	..	..
Ringbone	..	..	1	1·923	1	2·381	2	·823
Sidebone	24	16·107	1	1·923	..	..	25	10·288
Stringhalt	..	..	..	..	..	..	..	..
Thoroughpin	..	..	..	..	..	..	..	..
Through unsoundness	26	17·449	2	3·846	1	2·381	29	11·934
Through disapproval	20	13·423	10	19·230	4	9·524	34	13·991
Total	46	30·872	12	23·076	5	11·905	63	25·925

"All-Time" Record ——— Standard Herd Test

Banyule Tiddlewinks 26th.

THE Jersey cow "Banyule Tiddlewinks 26th" has produced an all-time record for all cows in the Victorian Standard Herd Test for 1941-42. Her production figures are 15,096 lb. of milk, 6·20 per cent. average test, 935·3 lb. of butterfat in 273 days. This exceeded the previous record held by the mature Friesian cow, Springfield No. 9, by 75 lb. of butterfat.

The record is notable in that "Banyule Tiddlewinks 26th" is a junior four-year old. She produced 41½ lb. of milk on the last day of test. The previous record for a junior four-year old was 738 lb. of butterfat, and was held by the Guernsey cow, Yarraview Le Mode.

"Banyule Tiddlewinks 26th" is owned by Banyule Stud Pty. Ltd. (C. Gordon Lyon). The Banyule Stud has been continuously in the Victorian Standard Herd Test since its inauguration in 1912.

SOFT CURD AUTUMN MILK

Its Treatment for Cheesemaking

By A. C. E. SMITH, B.Agr.Sc.

THE alteration in the composition of milk produced under open grazing conditions during drought is such that, when coagulation of this milk is effected by rennet, a "Soft Curd" results.

In cheddar cheesemaking, we rely upon rennet action in combination with temperature and lactic acid development for the production of a suitable curd, and the operations involved are based on the rate and degree to which the changes take place as a result of this combined action.

After coagulation of the milk has taken place and the coagulum has been cut, the operation of expulsion of whey from the curd commences.

With Soft Curd the expulsion of whey is difficult if normal cheese making technique is used.

The retention of whey in curd above a desired point results in a sour cheese which rapidly goes off flavour on maturing.

The relationship between Soft Curd milk and cheese quality therefore is particularly significant.

Large-scale cheesemaking is arduous work, and the additional manual effort required to firm and dry out soft curds has a wearying effect on employees.

Before continuing with a discussion of the means of treating Soft Curd milk, it would be as well to review the conditions necessary for rennet action.

The phases of rennet action with which we are here concerned are:—

1. Coagulation.
2. Whey expulsion.

The rate of coagulation and the character of the clot are influenced by—

1. The temperature employed.
2. The previous heat treatment of the milk.
3. The hydrogen ion concentration.
4. The concentration of casein.
5. The concentration of calcium.

The optimum temperature for rennet action cannot be employed in making cheese since an undesirable clot is formed at that temperature and furthermore the temperature is above the upper limit for the growth of *Streptococcus lactis*, the organism constituting the starter culture.

Milk which has been heated to temperatures exceeding 170°F. will not readily re-act to rennet in coagulation, since calcium phosphate has been rendered unavailable. Coagulation is effected if soluble calcium salts are added or reformed in the milk.

The hydrogen ion concentration must be favorable. The milk requires to be either neutral or acid in reaction. It has been shown that the retractability of the clot and expulsion of whey depend upon a proper pH.

Increase in casein concentration speeds up coagulation; dilution of casein produces a weak clot.

Soluble calcium salts have been shown to be essential for the coagulation of milk by rennet.

Casein is present in milk in the form of calcium caseinate. The change of calcium caseinate to calcium paracaseinate is induced by rennet. The clotting of calcium paracaseinate, which is the final act in rennet coagulation, is only effected in the presence of soluble calcium salts.

The calcium phosphate in milk is present as a suspension of $Ca_3 (PO_4)_2$ tri-calcium phosphate, which is insoluble, and in the form of soluble $Ca HPO_4$ di-calcium phosphate.

The action of lactic acid in rendering available soluble calcium phosphate or rather in increasing the concentration of $Ca^{\cdot\cdot}$ ions has a stimulating effect on coagulation.

$$Ca_3 (PO_4)_2 + 2H \bar{L} \rightarrow_2 Ca HPO_4 + Ca (\bar{L})_2$$

It has been shown that increasing amounts of calcium phosphate in the milk not only increases the firmness of the clot but also the rapidity of coagulation.

The completeness of the casein coagulation and the rapidity with which it is effected depends upon the extent to which the foregoing factors apply to the particular milk.

The calcium in milk is directly proportional to the casein content.

Drought milk is generally low in solids not fat, and low in calcium. Its pH is higher than normal and therefore less soluble calcium is available for coagulation. Consequently the coagulation is slow, incomplete, and weak, and whey expulsion from the curd is retarded. The incidence of mastitis also causes a reduction in the curd tension of milk.

The means available to increase the soluble calcium salts in the milk are—

1. *By "ripening."*—The fermentation of lactose to lactic acid by the "starter" organisms in order that sufficient lactic acid is produced in the milk so that the $Ca_3 (PO_4)_2$ is rendered soluble.

The reaction—

$$Ca_3 (PO_4)_2 + 2HL \rightleftharpoons 2 Ca (HPO_4) + Ca \bar{L}_2$$

goes in the forward direction. The time factor involved in ripening, and the stimulus given to the rate of lactic acid development during the subsequent stages of manufacture limits the extent to which ripening can be practised, and liberation of sufficient soluble phosphate is therefore not possible by this means in the case of soft curd.

2. *By the addition of soluble calcium salts.*—The addition of calcium chloride to the milk before renneting has the effect of improving the rennet coagulation. In particular its use has been in the case of milk that has been pasteurized at temperatures in excess of 165°-170°F. with the object of making a good "kill" and driving off persistent fodder taints.

The reaction—

$$Ca Cl_2 + {}_2 Ca HPO_4 \rightleftharpoons 2 H Cl + Ca_3 (PO_4)_2$$

proceeds in the forward direction and a sufficient quantity of $Ca Cl_2$ must be added, otherwise the reaction exhausts the $Ca Cl_2$. This phase therefore is important in the stage subsequent to coagulation, i.e., whey expulsion.

It has been shown that a calcium paracaseinate sol when precipitated by calcium chloride gives a flaky precipitate.

While in the presence of soluble calcium phosphate, calcium paracaseinate forms a clot.

Calcium chloride, however, has not proved very successful in assisting in the treatment of Soft Curd milk in Victoria.

The quantity of calcium chloride required is considerable in relation to the calcium content of normal milk.

3. *The pre-acidification of the milk with hydrochloric acid before renneting.*—The acidification with hydrochloric acid of milk for cheesemaking was first practised by Sammis and Bruhn. They were concerned in the manufacture of pasteurized milk cheese, and part of their technique was to raise the acidity of the milk to 0.25 per cent. with hydrochloric acid prior to renneting.

It does not appear to be necessary to acidify with hydrochloric acid for the manufacture of pasteurized milk cheese made from normal milk in Victoria.

When hydrochloric acid is added to the milk, the explanation of its action is as follows:—

(*a*) H Cl being a strong acid the pH of the milk medium becomes better suited to the action of rennet for coagulation and whey expulsion.

(*b*) The liberation of soluble calcium phosphate is much more rapid than is the case with the lactic acid produced by the action of the starter organisms, for the same reason that hydrochloric acid is a strong acid.

TABLE 1.—RECORD OF CHEESE MANUFACTURE.

	18th March, 1941.							19th March, 1941.						
Vat.	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Gallons of milk	850	850	900	900	900	900	530	875	825	900	850	875	875	525
Temperature pasteurized °F.	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Time starter added Minutes before starting	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Acidity milk and starter %	0·17	0·18	0·175	0·17	0·175	0·18	0·21	0·165	0·18	0·18	0·175	0·175	0·18	0·205
Acid set %	0·185	0·195	0·185	0·18	0·185	0·19	0·22	0·165	0·18	0·18	0·175	0·175	0·18	0·205
Temperature set °F.	87	87	87	87	87	87	87	87	87	87	87	87	87	87
Time set	9.45 a.m.	10.2 a.m.	10.19 a.m.	10.44 a.m.	11.2 a.m.	11.25 a.m.	11.42 a.m.	9.55 a.m.	10.22 a.m.	10.40 a.m.	11.15 a.m.	11.32 a.m.	11.50 a.m.	12.8 p.m.
Time to coagulate Mins.	11	11	12	12	12	10	9	14	13	15	15	14	14	11
Time to cut Mins.	30	30	35	33	33	30	25	40	35	35	35	35	35	26
Acid cut %	0·125	0·13	0·125	0·12	0·125	0·13	0·14	0·105	0·115	0·12	0·12	0·125	0·125	0·13
Temperature cooked °F	101	101	101	101	101	101	101	101	101	101	101	101	101	101
Whey run acidity %	·16	·16	·16	·15	·15	·16	·16	·15	·15	·15	·15	·15	·15	..
	12 noon	12.30 p.m.	12.40 p.m.	1 p.m.	1.15 p.m.	1.35 p.m.	1.50 p.m.	12.10 p.m.	12.30 p.m.	12.55 p.m.	1.30 p.m.	1.55 p.m.	2.10 p.m.	..
Whey off acidity %	0·205	0·195	0·20	0·20	0·195	0·20	0·19	0·20	0·20	0·205	0·205	0·20	0·20	0·21
	12.35 p.m.	12.45 p.m.	1 p.m.	1.40 p.m.	1.55 p.m.	2.5 p.m.	2.10 p.m.	12.45 p.m.	1.5 p.m.	1.30 p.m.	2.15 p.m.	2.35 p.m.	2.40 p.m.	2.45 p.m.
Whey dry acidity	0·27	0·265	0·26	0·25	0·25	0·26	0·26	0·26	0·25	0·27	0·28	0·26	0·26	0·32
Time dry	12.55 p.m.	1.15 p.m.	1.25 p.m.	1.55 p.m.	2.45 p.m.	2.25 p.m.	2.30 p.m.	1.10 p.m.	1.25 p.m.	1.55 p.m.	2.35 p.m.	3.0 p.m.	3.10 p.m.	3.15 p.m.
Number of dry stirs	4	6	4	4	5	4	5	5	4	4	4	4	4	6
Time milled Hours from dry	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Acid milled %	0·70	0·70	0·77	0·70	0·65	0·66	0·78	0·66	0·60	0·68	0·65	0·68	0·63	0·92
Acid salted %	0·86	0·88	0·86	0·82	0·82	0·85	0·90	0·82	0·82	0·82	0·80	0·84	0·80	0·92
Time salted	4.20 p.m.	4.40 p.m.	4.30 p.m.	4.50 p.m.	5.0 p.m.	5.25 p.m.	5.30 p.m.	3.50 p.m.	4.10 p.m.	4.45 p.m.	5.10 p.m.	5.35 p.m.	5.50 p.m.	5.50 p.m.
Cheese made	11 Ex. 1 L.	10 Ex. 1 M.	27 L. 12 Q. 7 M.	19 M.	18 M.	19 M.	12 M.	12 Q. 57 L.	21 Q. 5 M.	19 M.	19 M.	18 M.	18 M.	12 M.
Starter %	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
Colour Per 100 gal.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.	White ½ oz.
Hydrochloric acid c.c.	275	275	275	275	275	275	150	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Rennet Per 100 gal.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.	4 oz.
Salt Per 100 gal.	2¾ lb.	2¾ lb.	2¾ lb.	2¾ lb.	2¾ lb.	2¾ lb.	3 lb.	2¾ lb.	2¾ lb.	2¾ lb.	2¾ lb.	2¾ lb.	2¾ lb.	3 lb.
Fat content of whey (Werner-Schmidt method) %	0·27	0·29	0·27	0·35	0·34	0·29	0·29 Av. 0·300	0·30	0·34	0·32	0·36	0·38	0·31	0·28 Av. 0·327
Moisture content of cheese at two days old %	36·3	35·5	36·2	36·6	36·3	36·9	35·4 Av. 36·17	35·9	35·9	36·4	36·2	35·8	36·5	36·4 Av. 36·16

The reaction—

$$Ca_3 (PO_4)_2 + 2 H Cl \rightarrow 2 Ca HPO_4 + Ca Cl_2$$

readily makes available in the milk and curd calcium in the required form for satisfactory rennet action.

Apart from ripening, the addition of $Ca Cl_2$ and hydrochloric acid, the means available of increasing curd firmness are to set the milk at a higher renneting temperature and to use larger quantities of rennet. Both these means are, however, limited from the point of view of cheese quality.

In Victoria, Soft Curd milk is usually experienced in the latesummer and autumn in the Western District. January and February of this year in particular were drought months and the dry feed available for dairy cows was insufficient for the animals' requirements for bodily maintenance, let alone for milk production.

During this period, at several factories visited, the curd was extremely difficult to firm.

Rain at the end of February and in March and April, together with the proportion of autumn calving cows, was instrumental in restoring the milk back to a normal condition.

At the Glaxo Factory, Port Fairy, in February, it was noticed that curds were extremely difficult to firm. A small vat of local cheese was being made. It was decided to effect an improvement by the addition of hydrochloric acid. Thirty cubic centimeters of concentrated hydrochloric acid per 100

gallons of milk were added to the vat after being well diluted in water. Following is the manufacture record:—

	25th Feb., 1941.	26th Feb., 1941.
Gallons of milk	450	475
Temperature pasteurized ..	160°F.	160°F.
Time starter added ..	10.50 a.m.	10.45 a.m.
Temperature set	87°F.	87°F.
Acidity set	0.18%	*0.18% †0.19%
Time set	11.15 a.m.	11.10 a.m.
Time to coagulate ..	14 minutes	9 minutes
Time to cut	40 minutes	25 minutes
Acidity cut	0.12%	0.125%
Temperature cooked ..	101°F.	101°F.
First whey drawn ..	0.16%	0 16%
Final whey drawn ..	0.18%	0.18%
Acidity whey when curd dry	0.31%	0.28%
Number of Drystirs ..	7	2
Time curd dry	2.0 p.m.	2.15 p.m.
Time curd milled ..	4.0 p.m.	4.15 p.m.
Acid milled	0.81%	0.85%

Curd salted immediately after milling.
* Prior to addition of H Cl.
† After addition of H Cl.

Colour—½ oz. per 100 gallons.
Starter—1½%.
Rennet—4 oz. per 100 gallons.
Salt—2¾ lb. per 100 gallons.

Cheese made—	26th Feb., 1941.	26th Feb., 1941.
	12 quarters	12 quarters
	3 medium	3 medium

The moisture contents of the cheese taken at two days old were as follow:—

25th February—38.9 per cent.
26th February—36.2 per cent.

Moisture analysis of batches made prior to the 26th and days subsequent to the 26th were above 38 per cent.

To obtain additional information on the effect of pre-acidification with hydrochloric acid, a visit to the factory was made in March when the factory was diverting a large volume of its milk to cheese manufacture. On the 18th March all seven vats made were pre-acidified with hydrochloric acid, while it was not used on the 19th (see Table I. on previous page).

Although a coagulation was more rapidly obtained and the curd was ready to cut sooner in all vats made on the 18th, the subsequent firming of the curd was satisfactory and a similar amount of work was done in drying out the curds on each day, the curd was normal in behaviour subsequent to cutting.

It would therefore appear that the milk had returned to normal composition, the young growth subsequent to the February rain having had time to benefit the dairy cows' physiological processes.

The moisture content of the cheese taken at two days old shows no significant difference.

The slight significant difference in the fat content of the whey favoring the acidified vats can be accounted for by the increased firmness at cutting of the curd on this day.

One would also expect reduced casein losses due to a more complete coagulation and therefore a slightly increased cheese yield is to be expected.

From the foregoing, it appears that the pre-acidification of milk for cheesemaking from a cheese quality view point is desirable when summer and autumn conditions are such as to produce soft curd milk.

Acknowledgment.

Thanks are due to the manager of the Glaxo Factory, Port Fairy, for permission to carry out the trials, and to his technologist, who made the determinations of fat content of whey and moisture contents of cheese.

Advantages of Dehorning Cattle

Dehorning of cattle is a practice that should be carried out universally as it has everything in its favour, and if properly carried out, nothing against it. Fortunately this is becoming recognized by both graziers and dairy-farmers, the former of whom by using bulls of one of the hornless or polled breeds are breeding hornless stock, while the latter either remove the horns from their grown cattle or else literally "nip the horn in the bud" by applying Caustic to the immature horn when the calf is one week old. The principal advantages of dehorning may be briefly summarized as follow:—

Removal of a source of danger to human beings and also other animals. This means that skin wounds and torn udders would be reduced to a minimum.

Nervous cows can feed in safety.

Smaller yards are needed to hold the milking cows as they will stand quietly and not interfere with each other.

They also thrive better as they do not disturb each other when feeding.

Bullocks especially benefit, when being trucked long distances, as they cannot injure each other during transit.

Tubercle Free Herds

Accredited Tubercle Free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle Free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tuberculosis-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	60	Longerenong Agricultural College	Dooen	47
Banyule Stud Pty. Ltd.	Heidelberg ..	42	McNabb and Son, G. A.	Irrewillipe East ..	177
Black, I. S., Estate ..	Mount Noorat ..	52	Onley, W. H. ..	"Glenholme," Caldermeade	50
Clarke, A. B. ..	Glenormiston South	16	Payne, A. E. T. ..	"Yarra View," Lilydale	77
Dennis, Mrs. A. A. ..	Frankston.. ..	33	Payne, T. E. N. ..	"Woodburn," Kilmore	58
Dookie Agricultural College	Dookie	77	Powell, T. S. ..	"Carellen," Mansfield	46
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Geelong Grammar School	Corio	58	Samuel, Misses G. and E.	Lang Lang ..	48
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29	School of Horticulture	Burnley	9
Gorman, A. W. ..	"Cathcart," Alexandra	61	State Experiment Farm	Rutherglen ..	40
Holloway, R. W. ..	Caldermeade ..	70	State Research Farm	Werribee	229
Kilmany Park Farm Home for Boys	Sale	94	Wells, W. G. ..	Caldermeade ..	62
Lawrence, P. H. ..	"Rainga," Tarrawarra	72			

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two sets.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43	Christian Bros. ..	Doreen	41
Andrew, J. C. ..	Whittlesea ..	121	Clark, P. W. ..	Whittlesea ..	62
Andrew, W. ..	Whittlesea ..	160	Clements, M. and L.	Bundoora	135
Andrews, E. H. ..	Templestowe ..	28	Cobain, J.	Thomastown ..	40
Balharrie, J. A. ..	Whittlesea North ..	59	Collins, L.	Doreen	74
Barclay, A. H. ..	Whittlesea ..	107	Cornfoot, D. A. ..	Whittlesea ..	25
Barling, J. ..	Mernda	39	Cotchin, J. ..	Woodstock ..	18
Batten, R. J. ..	Wollert	51	Cotter, W. ..	South Morang ..	27
Bebbington, J. ..	Whittlesea ..	92	Coulthard, A. J. ..	Whittlesea ..	66
Benson, R. ..	South Morang ..	28	Cox, E. H. ..	Lower Templestowe	37
Booth, Mrs. A. ..	Warrandyte ..	8	Craker, E. Mrs. ..	Warrandyte ..	2
Bourke, G. J. ..	Fairfield	32	Cummings, H. R. ..	South Morang ..	20
Bradbury, A. K. ..	Diamond Creek ..	31	Danaher, J. V. ..	Whittlesea ..	63
Buckley, F. J. ..	Mernda	104	Danns, N. C. ..	Whittlesea ..	34
Bunting, J. ..	Epping	24	Deutscher, H. W. ..	Mernda	168
Cahill, J.	Epping	34	Deveney, M. ..	Bundoora	51
Callaghan, L. ..	Epping	36	Drysdale, J. C. ..	Warrandyte ..	37
Callaghan, T. F. ..	Thomastown ..	40	Edwards, C. J. and F.	Woodstock ..	25
Childs, G. P. ..	Whittlesea ..	53	Escott, G.	Epping	46
Chiminello, A. ..	Epping	44	Escott, S. A. ..	Epping	63

TUBERCLE FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Evans, Mrs.	Bundoora	29	Mosig, H.	Epping	24
Fellows Bros.	West Heidelberg	52	Nebel, Mrs. A. E.	Thomastown	38
Ferguson, M. A.	Whittlesea	92	Norton, Miss L.	Bundoora	37
Fitzsimmons, B.	Lower Templestowe	30	O'Hern, T.	Epping	58
Fox, A.	Mernda	59	O'Loughlin, W. L.	Epping	30
French, T. W.	Wollert	43	Parker, Mrs. A. E.	Greensborough	24
Gallus, E. A.	Doncaster	11	Pentland, C. V.	Templestowe	17
Gardiner, C.	Epping	20	Pettit, W. T.	Thomastown	36
Gass, S. McG.	Epping	27	Pitson, R H.	Yarrambat	17
Gibb, C.	Arthur's Creek	28	Player, A. D.	Epping	42
Graff, Mrs. M. G.	Mernda	24	Power, L. J.	Mernda	52
Graham Bros.	Whittlesea	71	Quinlan Bros.	Epping	49
Green, W.	Mernda	11	Raper, L. R.	Greensborough	36
Hall, J. E., Mrs.	Whittlesea North	13	Rawlings, J. H.	Whittlesea North	41
Hancorne, Miss M. R.	Yan Yean	27	Righetti, L. A.	Lower Templestowe	40
Harding, J. E.	Templestowe	42	Robson, Mrs. G. A.	South Morang	47
Hardwick, C. K.	Epping	35	Rodgers, E.	Whittlesea North	11
Hargreaves, Mrs. E. J.	Whittlesea	20	Rosewarne, Miss P.	Yan Yean	43
Harkness, H. J.	South Morang	31	Ross, A.	Templestowe	5
Harmer, R.	Wollert	38	Salcki, S.	Thomastown	51
Hawkes, Miss D.	Warrandyte	19	Seeber, B.	Thomastown	24
Hehr, H.	Epping	31	Shanks, B.	Mernda	73
Hehr, R.	Wollert	23	Sheeky, A. A.	Templestowe	14
Herd, J.	Wollert	41	Short, E.	East Preston	99
Hewitt, C. J.	Wattle Glen	12	Siebel, F.	Thomastown	26
Higgs, R. N.	Yan Yean	76	Skals, P.	Rosanna	28
Hobbs, F. J.	Doncaster East	6	Smirfitt, J. E.	Epping	39
Hobbs Bros.	Heidelberg	65	Smith, Mrs. F. L.	Mernda	18
Howden, A.	Epping	29	Smith, G. A.	Templestowe	63
Hughes, J.	South Morang	1	Smith, J. R.	Mernda	41
Jackson, Mrs. M. A.	Heidelberg	7	Smith, L. McA.	Yan Yean	7
Jenkins, T. H.	Whittlesea	14	Smith, L. W.	Bundoora	73
Johnstone, J. A., Miss	Mernda	14	Smith, P. A.	Ivanhoe	2
Jones, A. J.	South Morang	19	Smith, R. A.	Epping	27
Jukes, C.	Epping	34	Smith, R. J.	Epping	54
Jukes, W. H.	South Morang	35	Smith, S. E.	Epping	31
Junor, G. M.	South Morang	37	Stephens, H.	Epping	48
Kell, W. E.	Greensborough	21	Stinson, T.	Woodstock	29
Lay, P.	Alphington	30	Tarry, J.	South Morang	24
Loft, A. H.	Wollert	52	Thomas, W. C.	Yan Yean	31
McCormack, D.	Woodstock	33	Towt, C. W.	Glenvale	136
McDonald, A. J.	Whittlesea	2	Vallence, C. A.	Epping	11
McDonald, J.	Templestowe	20	Van, E. L.	Templestowe	28
McDonnell, R. H.	Greensborough	28	Walsh, J. B.	Templestowe	11
McGregor, W. B.	Mernda	41	Whelpton, B.	Whittlesea North	59
McKendry, J.	Doreen	47	White, W.	Greensborough	18
McKernan, A. H.	Whittlesea	24	Whittingham, E. W.	Greensborough	40
McKie, J. W.	Wollert	83	Williams, E. A.	Thomastown	33
McLean, J. F.	Bundoora	32	Williamson, J.	Doncaster (High-street)	5
McPhee, K.	Whittlesea	116	Wilson, J. E.	Diamond Creek	35
McPherson, H.	Yan Yean	64	Wilson, Mrs. M.	South Morang	14
Mann, D. and W.	Thomastown	108	Wood, A. V.	Yan Yean	125
May, Mrs. M.	Warrandyte	5	Wrest, W.	Epping	76
Mays, Mrs. A. M.	Doncaster	5	Wuchatsch, A.	Epping	29
Merriman, J.	Diamond Creek	17	Wuchatsch, J. D.	Epping	14
Miller, A. J.	Whittlesea North	47	Yann, A.	Wollert	52
Miller Bros.	Greensborough	36	Young, Mrs. A.	Wollert	33

There are also 81 herds in which 3,783 head of cattle have passed one test, and may be considered therefore, to be in process of becoming tuberculosis-free herds.

Contents.

JUNE, 1942

		PAGE
Primary Production and the War	*H. A. Mullett, B.Agr.Sc.*	273
Fodder Conservation Competition, Wangaratta District	*J. A. Morrow, B.Agr.Sc.*	279
Mastitis in Dairy Cows	*L. B. Bull, D.V.Sc.*	284
Fodder Conservation Competition at Pyramid Hill	*A. Morgan, B.Agr.Sc.*	286
Cheese Research		290
Handling and Treatment of Dairy Produce	*A. F. Bottomley*	291
Tuberculin Testing in Country Districts		294
Olive Culture	*R. Roberts*	295
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	301
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	307
Garden Notes	*J. L. Provan, B.Agr.Sc.*	308
Preserving Oranges		310
Certified Pullorum-free Flocks		311
Neutralization of Sour Cream for Buttermaking—Part 4	*F. S. J. Newman, B.Agr.Sc.*	312
Tubercle-free Herds		317
Standard Herd Records—Quarter ended 31st March, 1942		319
Use of Tourniquet to Control Bleeding		328

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

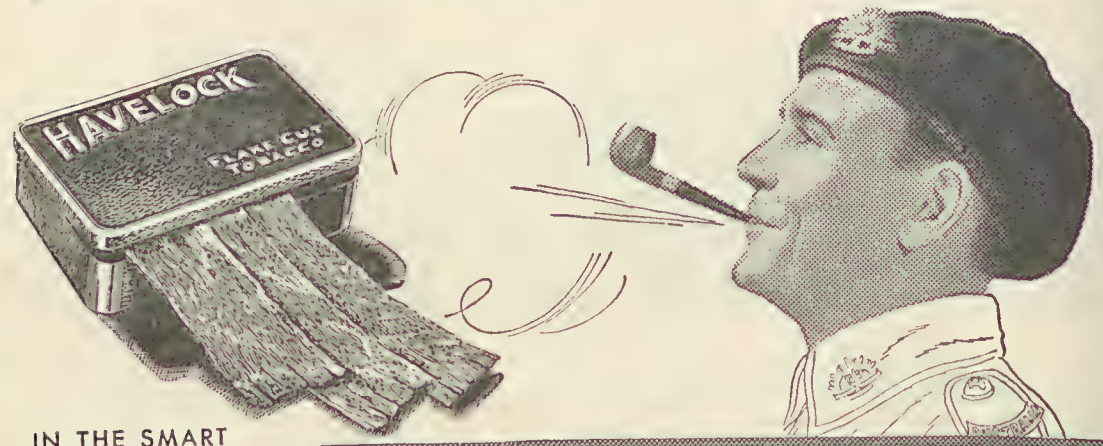
The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

For Cooler Smoking . . . Finer Flavour



IN THE SMART GREEN & GOLD PACKS . . . .

also . . . FINE CUT and READY RUBBED

850-10.40

HAVELOCK

Flake Cut Tobacco

INDEX TO ADVERTISEMENTS

FRONT SECTION

Davis Gelatine Pty. Ltd. iv

General Motors-Holden's Pty. Ltd. ... opp. p. 283

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. v

Law Somner Pty. Ltd. (Seeds) ... opp. p. 282

Leggo, Victor, & Farmers Ltd. ... inside cover

Lysaght Bros. & Co. Pty. Ltd. iv

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ii

BACK SECTION

Australian Cement Ltd. ... ... inside cover

Cockbill, J. vii

Commonwealth Serum Laboratories outside cover

Elder Smith & Co. Ltd. (Esa Bluestone) ... vii

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 318

Nightingale, A. G. & Co. (Nursery Stock for sale) vi

Rylands Bros. (Aust.) Pty. Ltd. ... opp. p. 319

State Savings Bank ... ... opp. p. 319

Trewhella Bros. Pty. Ltd. viii

Victorian Railways vii

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Journal of Agriculture, Victoria—June, 1942.

PRIMARY PRODUCTION AND THE WAR

An address prepared for the Victorian Chamber of Agriculture
— by H. A. MULLETT, B.Agr.Sc., Director of Agriculture —

WHEN first I addressed delegates of the Chamber of Agriculture on the subject Primary Production and the War, conflict was far from these shores. Although already the war had resulted in changes that were being severely felt by fruit growers and by wheat growers, for the most part it had stabilized export prices, and so, with the exceptions above, had consolidated the primary industries dependent on exports — industries which immediately prior to the war were facing the imminent possibility of restriction of production because of glutted overseas markets. Thus, for the time being, the threatened stagnation of Australian agriculture was avoided. The quantities named in the contracts made for the sale of our primary products to Great Britain were well within the productive capacity of Australian agriculture and of the individual producers, many of whom felt then that they had reserve power which they would like to employ in a special effort to make some definite contribution to the war.

Homeward bound!

Australian troops on their way back to Australia.

(Dept. of Information photo.

Owing to heavy shipping losses, more particularly in the Atlantic, the British Ministry of Food at length was forced to transfer more of its ships to shorter routes. This involved a reduction in the quantity of produce it could purchase from us and the placing of more of our staple exports lower on the priority list of goods entitled to space on overseas ships.

These changes, together with the requirements of the Allied Armies in the Middle East, resulted in dried and condensed milk, cheese,

and beef being placed high on the priority list, with butter, mutton, and lamb lower down. No shipping space was available for eggs in shell (a bulky product), and elaborate egg-drying plants were erected at very short notice in order to avoid chaos in the egg market. In addition, there were upsetting re-arrangements in the export of pig-meats which resulted in a lack of confidence in the pig industry. To relieve the meat position the export of low-grade mutton, beef, and pig-meat was prohibited. To stabilize the fat lamb industry, the Commonwealth agreed to acquire and store all lambs not required for the local market, but at a price lower than the price named in the contract with the British Government for export lamb. Collapse of the market for mutton was avoided by placing large orders for canned mutton required for the fighting forces.

When the British Ministry of Food intimated that it placed cheese on a higher priority than butter, steps were taken to induce a number of butter factories throughout Australia to undertake the manufacture of cheese, and to this end finance was provided to enable approved factories to extend their cheese-making plants and in many cases to erect new ones, and a scheme was drawn up under which such factories would be compensated in the event of the cheese market at a later stage proving unprofitable.

The order of magnitude of the changes, the period over which they took place, and the steps taken to bring them about were well within the capacity for adjustment of the various industries concerned, with the result that no serious disorganization of agriculture in Australia resulted.

The entry of the Japanese into the war, the fall of Malaya and the Dutch East Indies, and the carrying of hostilities to the north coastline of Australia have profoundly altered the outlook, and Australian agriculture, in common with the civil population, must now undergo some far-reaching adjustment in order that the new situation may be met. In the first place, the influx of troops from the United States and the Middle East has resulted in increasing the number of mouths to be fed in Australia and in varying the kind of things eaten. This has increased the home market for many products. In the second place, the urgency of the war situation has necessitated extensive demands for manpower being made on the whole community, including agriculture. In the third place, owing to enemy action, sources of rock phosphate have been greatly restricted, thus limiting the amount of superphosphate that it will be possible to make available to the primary producers during the coming year.

Dependent, of course, upon the extent to which the manpower call-up is pursued, by consuming what is required locally of our export surpluses, Australia should be self-sufficient in foodstuffs, but there will be a corresponding diminution in the quantities of produce available for export. Special efforts, therefore, will be necessary to "step-up" production in particular cases to meet the requirements of the fighting forces based on Australia and the needs of the British Government. The manpower call-up should be regulated with due regard to the relative importance of augmenting the fighting forces, staffing munition factories, feeding the troops and the civil population, and providing food for Great Britain, and will require the exercise of well-balanced judgment, as deterioration in production will rapidly follow loss of confidence in ability to retain or obtain labour and, just as

An up-to-date Victorian cheese factory.

Mr. Forde, Australian Minister for the Army, reviewing United States troops, accompanied by Major General H. Fuller.
[Dept. of Information

definitely, but perhaps less rapidly, result from failure to set aside adequate fodder reserves. Unless care is taken, production in particular areas may fall below requirements in dry seasons, and capacity to produce be seriously impaired, e.g., following loss of producing cows by drought. In this connexion it should be remembered that stock and agricultural produce cannot be readily transported from places of plenty to places of deficiency as in peace-time.

The dietary of the Allied troops from abroad varies considerably from that of the Australian population. Many of our friends from the United States have not yet acquired a taste for lamb or mutton. They consume more beef and pig-meats, fruit, and vegetables per head than we do. Heavy purchases of these commodities for military needs, both for canning and for immediate use, have reduced the supplies available for the civilian population.

Already it is clear that the Australian public will be obliged to consume more mutton and lamb and much less beef, pork, and bacon than formerly.

Eggs will be at a premium outside the normal laying season, and fresh vegetables will be in very short supply next spring unless householders seriously take the advice conveyed to them that they should make themselves largely self-sufficient in this regard. It should be appreciated by the uninitiated that the growing of vegetables is a skilled job, and there will be a disappointing waste of valuable seed and effort unless sound production methods are used and reasonable care is taken to space plantings so that gluts are avoided and continuity of supply carefully planned. Women in the metropolis should join the Women's Garden Army, where they can devote a few hours a week to the patriotic and utilitarian purpose of growing vegetables for the Red Cross under skilled guidance.

The heavy reduction in the quantity of superphosphate likely to be available to producers this year will further intensify the decline in production which the shortage in manpower is already inducing. In some forms of production, such as dried milk, condensed milk and whole milk for human consumption, vegetables, including potatoes, and flax, it is most important that production should be at a maximum, and hence adequate manpower

should be ensured to these industries, and a system of priorities for the use of superphosphates should be arranged; but this cannot be done except at the expense of other forms of production, which, in the absence of the normal dressing of superphosphate, will decline in volume. Because of careful field experimentation this decline can be fairly accurately estimated in this State: for example, a reduction by, say, 60 per cent. of the amount of superphosphate usually available on top-dressed pastures will, in a normal season, reduce production 30 per cent. on the areas top-dressed. This would represent a reduction of about 15 per cent., taking the State as a whole. The reduction would be greatest in the winter and early spring and less in the period of flush growth.

Until quite recently the purchasing authorities in Australia, on behalf of the Allied Forces, have been pre-occupied with the problem of procuring their immediate requirements. Recently, however, there are signs that the magnitude of the prospective purchases, the possibility of declining production owing to reduction of available manpower, and decreased supplies of superphosphate have brought a realization that close co-ordination is necessary between the purchasing authorities and those who have assumed for the time being the responsibility for feeding the civil population. This has resulted in an Allied Food Council being set up at Canberra. The Controller of Defence Foodstuffs will handle the defence food supply, and a special branch of the Commerce Department will be responsible for civilian needs. At the time of writing there does not appear to be a direct representative of Manpower Authority on the Council, and hence it is not clear what sort of co-ordination there will be between the agricultural production requirements of the nation and the manpower necessary to produce it. So far it has not been stated to what extent, if any, it is intended that the civil population shall be rationed in respect of any foodstuffs should supplies fall short of total requirements.

This, then, is the background of the problems facing the responsible authorities and the primary producers in this country in the third year of the war.

Summarized, the principal changes that would appear likely are:—

There will be less beef and pig-meat for the civil population, which must consume more mutton and lamb than formerly, and, because of the shortage of superphosphate and manpower, the production of mutton, and particularly lamb, is bound to diminish.

Dependent upon the extent of the purchases for the Army, of the superphosphate rationing, and the numbers called up, the export surplus of mutton and lamb will be correspondingly reduced. Some augmenting of supplies, of course, could be brought about by fattening to greater weights and utilizing lower grades.

The Commonwealth Government desires increased supplies of pig-meats for the fighting forces, and, in order to stimulate production, wheat for pig and poultry feeding has been reduced 6d. a bushel. Such wheat may

Make vegetable growing at home one of your spare-time war jobs.
[*Leader photo.*

American troops are hearty eaters, but they have not yet acquired a taste for mutton and lamb.

[*Dept. of Information photo.*

be purchased direct from the Australian Wheat Board in truck loads, and arrangements are under consideration as to the means by which this reduction will be passed on when the wheat is purchased through middlemen. Shortage of labour, the reduced number of breeding sows, and the absence of barbed wire are of course, severely restricting production in this industry.

The addition of nine new cheese factories or extensions to existing butter factories is expected to increase the production of cheese to 15,000 tons in this State.

Condensed milk factories have been working to capacity for some time, and have increased their production by 100 per cent. over last year. Special efforts by producers should be made to ensure adequate supplies of milk to condensories and cheese factories.

Already some of the milk is being hauled long distances, and adequate phosphate supplies will be required for top-dressing the producing farms in order to maintain production at existing levels.

A substantial decline in butter production must ensue owing to the reduction of manpower in the industry and to reduced supplies of superphosphate, and, unless the season is specially favorable, the exportable surplus will be considerably reduced.

More eggs are needed, especially in the periods of the year when production is low. At these times the civil population will go very short of eggs, but there should be a surplus above civilian requirements available for drying and export as dried eggs in the spring. The reduced price of wheat for poultry should tend to an extent to offset the manpower shortage, but production is bound to decline.

There is an increased demand for dried fruits in Australia owing to military needs, and we may not be able to fill the whole of our contract with Britain, which, at the moment, is cut off from portion of the Mediterranean countries. This industry suffered a manpower crisis last harvest which may be intensified next year.

Many thousands of tons of vegetables, including blue peas, navy beans, carrots, green peas (for canning), parsnips, beetroot,

tomatoes, cauliflower, stringless beans, onions, swedes, &c., are required, and here is an opportunity for producers in the irrigation areas and the more favoured districts to engage upon a profitable and patriotic enterprise.

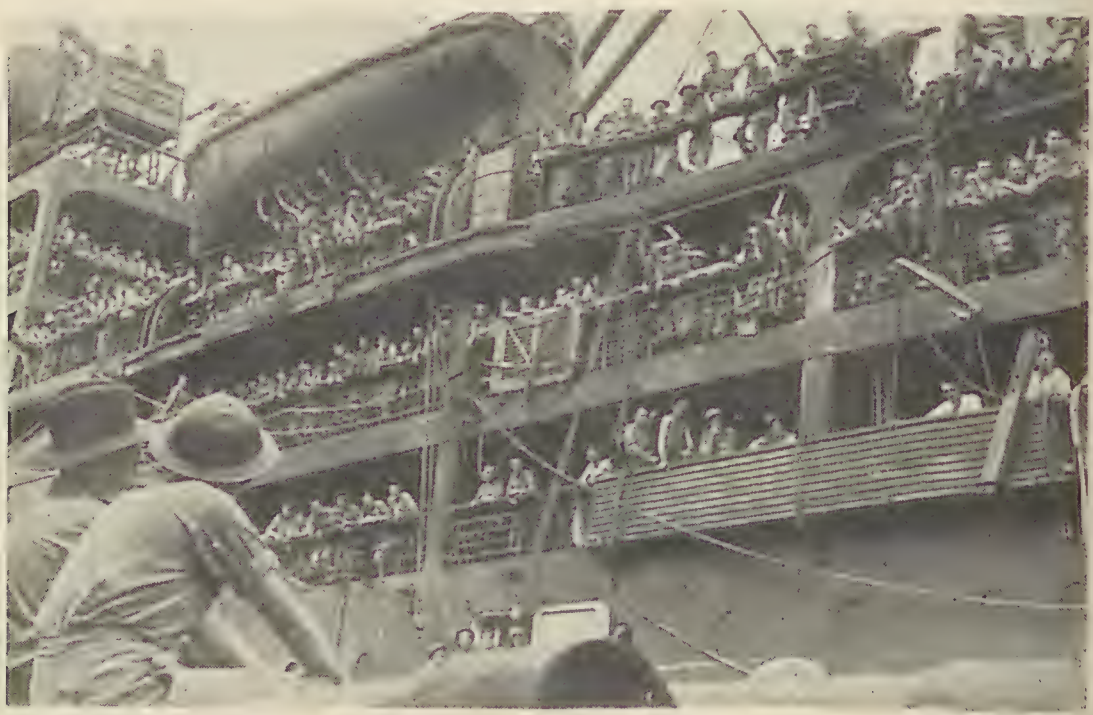
Large increases in the production of the seeds of the following vegetables are required:—Red beet, carrot, cabbage, cauliflower, lettuce, onion (early types), parsnip, swede turnip, white turnip, tomato. Many contracts already have been signed, and good progress in securing this necessary seed has been made.

An increase of up to 50 per cent. in the area planted to potatoes in this State over last year's acreage is urgently needed to meet military and civil needs. Even so, there will be a shortage during the next few months which will necessitate merchants being rationed to a proportion of their normal quantity. Given the necessary manpower and superphosphate, however, it should be possible to obtain this increase by means of an intensive drive. A minimum price will be guaranteed, and, in the event of a surplus, a proportion of the crop may be dried.

Prior to the war the flax industry expanded in a few years from 200 acres to 2,000 acres, and in the second year of the war it was "stepped-up" to 28,000 acres in this State, and ten mills and six depots were established or are being established. This year the requirement is about 32,000 to 34,000 acres, and there is every prospect that this will be secured. The price for flax straw of standard quality is £6 5s. per ton.

Small areas of opium poppy for the production of morphine are being grown by the Department, and successful research has been conducted into the production of the drug ergot, and a commercial method of producing has been evolved.

Consideration of all these problems shows the need for careful planning and organization to secure the desired results, and it is clear that agriculture, which is normally dependent upon low-paid itinerant labour for rush periods, such as harvest, must have access to a pool of labour. With proper organization this could be arranged, and females as well as males employed for lengthy periods of continuous work by skilful dovetailing of the harvest sequences.



Australian troops who recently returned to their homeland from abroad.

[Dept. of Information photo.

FODDER CONSERVATION

WANGARATTA DISTRICT COMPETITION

Report of the Judge—J. A. MORROW, B.Agr.Sc., Manager, Rutherglen Experiment Farm

Haymaking in North-Eastern Victoria.

FOR highest returns from dairying it is essential that maximum economical production be obtained from each cow during its lactation period. Production being continuous, the daily fodder needs must be provided, otherwise milk yields will fall, not only during the period of underfeeding, but for the whole lactation.

The most economical method of feeding is by grazing good pasture, but owing to wide variations in seasonal growth, maximum yields cannot be obtained from grazing alone. For this reason the maintenance of a reserve is necessary to ensure fodder for lean seasons, and for supplementary feeding when required. Fodder conservation competitions are designed to foster such conservation and to disseminate information regarding methods of handling and storage. The present competition was sponsored by the Royal Agricultural Society of Victoria.

In the Wangaratta district, conservation as meadow hay is widely practised; but silage, cereal hay, and grains are used also, but to a limited extent. The type of fodder conserved must vary according to the facilities for handling and type of farming practised, but, generally, it is more economical to use the excess of spring growth as a basis for conservation than to sow particular crops such as oats for the purpose.

Normally there is heaviest growth during the spring, and if this is cut and stored some provision for the remainder of the year is provided at relatively low cost. In addition, the pastures may be improved by the removal of weeds and the elimination of the effects of selective grazing by the stock. In some years the amount of spring growth greatly exceeds the average, and when this occurs an opportunity is afforded for conservation of large quantities of fodder at minimum cost. It is desirable, therefore, to take advantage of good seasons to conserve as much fodder as possible, regardless of the extent to which normal requirements are exceeded. If ample reserves are obtained in this manner, and are effectively protected, it may be possible to forego harvesting in poorer seasons when the costs would be considerably higher.

A useful reserve of meadow hay.

When spring growth is heavy harvesting operations may be prolonged, and it becomes necessary to modify the method of conservation. This is best done by commencing the harvest early and making silage until conditions are suitable for curing meadow hay. If silage is made carefully in pits or trenches it will last indefinitely without deterioration. It has additional advantages, in that it is fireproof, and the trench does not require fencing. For temporary storage, stacks may be used.

Inspection of the competing farms revealed that some improvements could have been made in the selection of sites and methods of handling, and the following suggestions may be helpful:—

The pit or trench usually consists of an excavation up to 6 feet deep. For effectiveness of consolidation and ease of handling it is desirable that it should be rectangular, and of sufficient width to allow the implements and vehicles used to pass freely along the trench. The trench should be filled above ground to a height at least equal to its depth. If the material has been well trampled during filling it should settle down so that the finished silage will be far enough above ground level to prevent water lodging on the top. The surface then should be covered with soil.

The selection of a site for a silage trench is important. It is more or less permanent, and is likely to be filled many times. It is necessary, therefore, to look beyond the immediate season, and possibly compromise with regard to suitability of position between present and future harvests. The material to be ensiled will consist largely of water, and the further it has to be transported the greater will be the effort required, and the longer the operations will last. Hay and silage making are usually busy times, and any reduction in the time taken will be of direct benefit in the handling of a heavy harvest. Feeding out and other factors must be considered also, but these are generally less urgent than harvesting, and preference should be given to a site which would facilitate the latter.

The best position for a trench is in the side of a slope into which vehicles can be backed when feeding out. If the trench is cut in level ground greater difficulty will be experienced in getting the silage out. In addition, the trench is liable to become partially filled with water, and although this may damage only a small portion of the silage, handling is likely to become difficult and unpleasant.

For best results it is essential that the work be carried out as quickly as possible, and on reasonably level ground pasture sweeps can be very effective. The sweeps should be checked over to make sure that the fingers are rigid and in correct alignment. With some types of pasture, particularly subterranean clover, there is a tendency for the material to "ball up" in front of the points. Immediately this is noticed, the sweep should be stopped and pulled back a few inches. To try to make the sweep function by forcing the points down is seldom successful.

After a few loads have been placed in the trench the horse should be driven over the material with each load to assist consolidation. If a cart or wagon is used, it should be driven through the trench for the same reason.

Stack silage also requires rapid filling for best results. The use of a grab stacker in conjunction with sweeps will reduce labour costs, and increase the speed of the operation. A stack about 20 feet in diameter is large enough for convenient handling. Usually, the smaller the stack the greater the amount of waste. On the other hand, the normal equipment on a dairy farm is not sufficient to permit larger

stacks to be built quickly enough to produce best results. When the required height is reached, the stack should be weighted down with a layer of soil.

Stack silage will deteriorate, and more material than can be consumed within twelve to eighteen months should not be made at a time.

When the required quantity of silage has been stored, further conservation should be in the form of meadow hay. The pasture, which in the Wangaratta district consists mainly of subterranean clover, should be cut while still immature. If left until dry, much of the leaf will be lost and a poor quality, stemmy hay of low nutritive value will result. The clover is the main source of nutriment, and its value depends on the amount of leaf conserved. After cutting, the hay should not be left in the paddock any longer than is necessary to complete curing. It then should be stacked or pressed and unnecessary handling avoided. Pressed hay, though more costly to conserve, has the advantage of being easily transported, stacked and stored without undue risk of damage. It is also in a convenient form for feeding out, and the quantities fed can be gauged much more accurately.

Usually, a sufficient reserve for two years' supplementary feeding represents a safe margin of conservation. If this quantity is exceeded in other than exceptional conditions, it may be regarded generally as an indication that the farmer is sacrificing carrying capacity for the sake of an emergency which may not occur. This, of course, does not apply to cases where the reserve has been built up very cheaply from excess growth in favorable seasons.

The actual quantity of fodder to conserve requires a good deal of judgment, and will vary according to the type of stock carried, nature of the soil, and to the incidence and reliability of the rainfall.

The dairyman must keep his producing cows on a high nutritional level throughout the year, whereas sheep receiving little more than a maintenance ration for considerable periods can be raised profitably. There is a much wider margin of profit due to supplementary feeding of dairy cows. Also sheep make much better use of pasture residues, such as clover burr, during the summer.

On some farms it is possible to grow summer crops such as maize or sorghums, and these, together with certain types of pasture plants, may be regarded as a natural form of conservation. Where continuity of feed is ensured by these, the need for mechanical conservation is greatly reduced. Good examples of this were provided by the spectacular growth of strawberry clover on Mr. H. Klemm's property at Londrigan and the paddocks of lucerne and maize grown by Mr. W. J. O'Brien at Hansonville.

Problems of labour and equipment may make it impracticable for a dairyman to carry economically the maximum number of stock, and many cases of apparent understocking are the result of inability to handle more stock under existing labour conditions. Under such conditions an extra reserve becomes a desirable insurance against future labour difficulties.

As one competitior remarked, "It is better to have it and not need it than to need it and not have it." If not carried to wasteful excess, this motto is worthy of general adoption by all stock raisers.

The grab stacker in operation.

The Competition.

A winner of many similar competitions, Mr. W. J. O'Brien, of Hansonville, was awarded first place. On his farm of 164 acres he has developed a well-balanced system of pasture improvement, with the result that he has been able to provide his stock with a variety of high-quality pastures, and at the same time to conserve fodder suitable for supplementary feeding throughout the year.

The pastures consist mainly of subterranean clover and perennial rye grass, although some 11 acres of *Phalaris tuberosa* and subterranean clover have been sown with satisfactory results. In some paddocks there is also an appreciable amount of White Dutch clover. Further variety has been supplied by 19 acres of lucerne and 2 acres of maize.

Fodder conserved consisted of meadow silage, maize silage, meadow hay, and lucerne hay. In addition, 40 bags of wheat were stored, to be used mainly for feeding pigs.

For the establishment of his pastures, Mr. O'Brien sows 4 to 5 lb. of perennial rye grass with 2 lb. of subterranean clover. Frequently 4 to 5 lb. of Italian rye grass is added to the mixture. The Italian rye grass does not persist in the pasture, but is valuable in providing bulk of feed in the first year or so.

The paddocks are top-dressed annually with 90 lb. of superphosphate, the lucerne receiving an occasional double dressing.

At the time of inspection the pastures were dry and rather unattractive, but the quality and composition of the hay cut in the spring leaves no doubt as to the standard of improvement reached.

The hay, which consisted of rye grass and subterranean clover, was nicely cured, but could, with advantage, have been cut a little earlier. A large proportion was baled and stored in a good shed, conveniently placed near the cowshed. The remainder was stacked in the paddocks from which it was cut. It was the intention of Mr. O'Brien to have this pressed also, but owing to the press not being available, due to labour difficulties, he was forced to leave it in stacks and await a later opportunity. These stacks were rather ineffectively protected from stock, and had no protection from weather.

The meadow hay stacked in the shed was of excellent quality, but the lucerne hay—the product of a previous year—was somewhat stemmy, and contained a fair proportion of annual rubbish.

The stack silage consisting of *Phalaris tuberosa* and subterranean clover, though cut a little too mature for best results, was in very good condition.

To minimize labour in feeding, Mr. O'Brien had arranged the distribution of his stock so that they were fed in paddocks where he was working, or where back loading could be arranged.

The fodder conserved consisted of approximately:—

Meadow hay	114 tons
Lucerne hay	34 ,,
Silage (most of it in pits) ..	232 ,,
Wheat	3 ,,

This material was the equivalent of 193 fodder units for 84 stock units, comprising:—

Dairy cows	55
Yearlings	19
Bulls	2
Horses	2
Sheep	12

The provision of summer crops and lucerne added to the variety and increased the value of the fodder conserved.

Second place was secured by Messrs. H. J. and H. F. Klemm, of Londrigan, who had conserved 305 food units on 340 acres. The fodder consisted of:—

Oaten hay	220 tons
Oaten chaff	2 ,,
Oats	520 bags
Wheat	400 ,,
Meadow hay	60 tons

The fodder was of good quality throughout, and variety was afforded by a vigorous stand of strawberry clover, which supplied a good bite of succulent feed even at the end of a particularly dry season. An area of 13 acres has been sown to lucerne, and will add further to the variety. Location and protection of the fodder were well arranged, although better insurance against fire possibly would have been obtained if all the reserves had not been placed in the same stackyard.

Messrs. Klemm's property, with an assured growth of strawberry clover on the flats, is probably unique in the district, and these competitors have been able to adopt methods of feeding and management which could not be used by other farmers, even in the immediate vicinity. For winter feed, Lampton oats are sown with a combine on wheat stubble. The oats are grazed

from June until about the middle of October as supplementary grazing to the pastures. The recovery is usually good, and frequently high yields of hay are obtained. For the remainder of the year the strawberry clover provides a bulk of succulent feed, and the need for conservation as silage is obviated. Bail feeding with chaff and crushed grain has given very satisfactory results, and a large proportion of the fodder reserves consists of oaten hay and cereal grains.

Filling a pit silo with surplus pasture.

The stock consisted of 45 milking cows, 10 dry cows, 16 yearling heifers, 30 calves, 6 bulls, 8 horses and 100 sheep. In addition, about 80 pigs are raised each year. The raising of pigs on similar fodder to that given to the cows makes it difficult to compute the fodder-stock ratio, but it was evident that ample reserves were held to meet all requirements for the stock on hand for at least two seasons. About 100 sheep are carried regularly, but occasionally up to 900 are carried for various periods. It is understood that the number of sheep is not increased unless adequate paddock feed is available, the reserves being used for feeding the regular stock only. The judging was therefore confined to the actual position at the time.

The principle of having sufficient reserves on hand for normal carrying, and the utilization of any excess growth by grazing extra stock, is an ideal method of taking the maximum advantage of seasonal variations. Grazing is the cheapest method of fodder utilization. It requires less labour, and it is possible to use the fodder without wastage at the best stage of growth. Unfortunately, the practice is not possible generally, and most farmers are unable to vary their stocking rate according to seasonal growth.

Third place was awarded to Mr. P. J. Tanner, of Greta South. Mr. Tanner also had reserves sufficient to meet two years' requirements. The fodder, which was obtained mainly from perennial rye grass and subterranean clover pastures, was conserved as silage and meadow hay. The quality of each was good, although portion of the hay was over-mature and contained some docks. The silage pits and hay stacks were well placed with regard to handling operations, but protection from stock and fire was not good.

The sown pastures consisted of mixtures containing subterranean clover with Italian rye grass, perennial rye grass and cocksfoot, *Phalaris tuberosa*, and perennial and Italian rye grasses. A paddock of wild white clover was giving satisfactory results, but the perennial rye grass pastures were outstanding.

The remaining competitors had high-quality reserves of suitable fodder, but lost points mainly through not having sufficient fodder on hand to score under the heading "Fodder in excess of requirements."

Details of points allotted are as follow:—

FODDER CONSERVATION COMPETITION—WANGARATTA.

Name.	Quantity and Quality.	Green Crops.	Quantity in Excess.	Suitability.	Condition of Stock.	Location.	Protection.	Total.
Maximum Points ..	80	10	60	15	10	10	15	200
W. J. O'Brien, Hansonville	78	7	59	15	10	8	12	189
J. H. and H. F. Klemm, Londrigan ..	77	6	58	14	10	9	13	187
P. J. Tanner, Greta South	77	..	58	14	10	9	10	178
R. T. Hempel, East Wangaratta ..	76	..	45	13	10	8	11	163
A. J. and H. J. McDonald, Moyhu ..	60	..	..	14	10	10	13	107
J. J. O'Brien, Lower Greta	62	..	..	13	9	8	13	105

Mastitis in Dairy Cows

Its Prevalence in Victoria

By L. B. BULL, D.V.Sc., Chief, Division of Animal Health and Nutrition,
Council for Scientific and Industrial Research

AN investigation into the cause and into the control of mastitis in dairy cows was commenced in 1935. It was undertaken at the request of the Australian Dairy Cattle Research Association (now the Cattle Research Association), and this body arranged to finance it from a fund supported by the Commonwealth and State Governments, the Commonwealth Bank, the Australian Dairy Board, and other branches of the dairying industry.

The nature of the work and of the results obtained have been briefly outlined in the annual reports to the Cattle Research Association. The first scientific report was published as Bulletin No. 134 of the Council for Scientific and Industrial Research.

An experimental herd was established, and intensive and systematic bacteriological and clinical examinations have been carried out on this herd. In addition, examinations have been carried out in several commercial herds.

The Investigation Committee decided that, in addition to the information being collected in this way, some attempt should be made to obtain more exact information on the prevalence of mastitis in a more or less restricted area, the wastage caused by it, and the usual form it takes. Victoria was chosen as the area to be surveyed in this way, the committee bearing in mind that a similar inquiry might be extended to the other States of the Commonwealth if and when opportunity offered.

In order to obtain information on the prevalence of the disease in Victoria a questionnaire was prepared, and this was circulated by dairy supervisors of the Department of Agriculture and officers of the Victorian United Cow Testing Association, through the willing co-operation of the Director of Agriculture and the Council of the Association respectively.

The questions were made as simple and as direct as possible, but it was realized that questions even of this simple nature are not always easy to answer. The information collected cannot be regarded as revealing exact figures, but it does contribute to a more complete understanding of the problem.

We will not attempt to analyze and discuss here all aspects of the subject dealt with in the questionnaire. Some of the information obtained gives pointers which show the necessity for further inquiry and investigation before a more complete picture can be obtained of the occurrence of the disease, its prevalence, and the economic loss it causes to the industry in Victoria.

An examination of the replies received gave the following results, which are summarized hereunder:—

Number of Herds.—Replies were received covering 887 herds.

Number of Cows.—In all 38,074 cows were distributed among the herds. Of these, 34,633 were grade cows, 1,825 pure-bred, and 1,616 unclassified.

Method of Milking.—Machine milking was the method used, with 606 (70 per cent.) of the herds; hand milking with 241 (27 per cent.); both machine and hand milking with 22 (2 per cent.); and 18 of the replies failed to state the method.

Nature of Product.—Cream was the product from 568 (64 per cent.) of the herds; whole milk from 278 (31 per cent.); both cream and milk from 26 (3 per cent.); and milk for cheese from 10 (1 per cent.).

Manifestation of Mastitis.—An attempt was made to determine how mastitis developed in the cows, particularly if it were more or less acute and apparent from the start, or if there were gradual loss of production without obviously acute symptoms. The question proved too difficult to answer, possibly because acute symptoms are more obvious and are depended upon for the recognition of the disease. An attempt was made to answer the question in 763 of the replies. Of these, 215 (28 per cent.) stated that the disease was usually gradual in its onset, 451 (59 per cent.) that it was usually acute in its onset, and 97 (12 per cent.) stated that both forms were experienced.

Probably these figures cannot be taken as representing the true state of affairs, but they are interesting in showing that mastitis may be insidious in character and that some herd masters recognize this.

Herd Wastage.—The replies show that on the average the annual culling for all causes is approximately 18 per cent. Of the cows culled, however, 46 per cent. are said to have been culled because of mastitis. This figure appears to be very high, and may be higher than is actually the case. In some instances, no doubt, a cow should be culled for low production, for age, or for other reasons, but if it develops mastitis there is no longer any hesitation in removing it from the herd. Very careful records would have to be kept in each herd before an accurate estimate of the wastage due to mastitis could be obtained. Nevertheless, the indications are that mastitis does cause a great deal of wastage in dairy herds in Victoria, and is probably the largest single contributor to wastage.

Herd Incidence of Mastitis.—Of the 870 returns which are sufficiently complete, 77 (9 per cent.) deal with herds said to suffer little or no loss or trouble from mastitis. This figure is somewhat misleading, and is probably higher than is really the case, as some owners say they experience little trouble because they remove cows from the herd at the first sign of disturbance in the udder. There is a small percentage of herds, however, which according to the reports experience no trouble from mastitis. The disease is to be found in the majority of herds, causing serious loss and inconvenience in many. This loss, however, cannot be determined.

Control Methods Adopted.—Some 661 of the reports indicated whether or not methods were adopted to control the spread of mastitis in the herds. In rather more than half (55·8 per cent.) serious attempts at control were not made. In 17 per cent. culling or segregation of affected cows was practised. The milking of affected cows last was carried out by 7·5 per cent. Vaccines were used by 17 per cent., but satisfactory results were reported by only 38 per cent. of those using them. The remainder depended upon a combination of culling and the order of milking.

Seasonal Incidence of Mastitis.—Comments were offered by 764 on whether or not mastitis occurred most commonly in any one season. Of these, 212 (28 per cent.) found it to occur at any time of the year, but 552 (72 per cent.) found it to be more common in one season than the other. Of those experiencing a seasonal incidence a small majority (57 per cent.) found it to be more common in the spring, 20 per cent. in the winter, 12 per cent. in the summer, and 11 per cent. in the autumn.

As the majority of the farms under survey were supplying cream, and the herds were at full strength in the spring, it is not surprising that mastitis was seen most commonly in the spring.

Method of Replacement.—In 864 replies it was revealed that in 555 (64 per cent.) herd replacements were made entirely by breeding, in 81 (9 per cent.) by purchase of new stock, and in 228 (26 per cent.) both by breeding and purchase of new stock.

Age Incidence of Mastitis.—The replies indicated that prevalence of mastitis increased with age, although cows of all ages may be attacked. Exact figures of prevalence according to age could be obtained only if records of the age of all cows, when first affected, had been available.

Mastitis at the First Calving.—As the disease is commonly believed to be spread by hand, or by machine in the milking shed, it is of some importance to know if it occurs in first-calf heifers at the time of calving. The replies show definitely that the disease may occur in this way at times. Only 206 (23 per cent.) of the 887 making returns had ever observed first-calf heifers to come in with the disease. Nevertheless, the fact that it does occur in this way is of great importance.

The results of this analysis do not solve any problems, but they help to show the magnitude of the general problem of mastitis. The data are not exact, but nevertheless they have a value. They may help also to show the value of dairy farmers keeping more exact records on the incidence of mastitis and the causes of herd wastage each year. By means of this sort, the relative importance of problems within the industry can be assessed. More exact information on seasonal occurrence, the age of cows when they first develop signs of mastitis, and on the spread of mastitis within the herd would be of very great assistance to the investigators. Co-operation with herd testing officers could accomplish much in this way, but we will have to wait for happier days before steps can be taken in this direction.

Acknowledgments.

The committee would like to express thanks to the many dairy farmers who have co-operated by replying to the questions asked, and to the dairy supervisors and herd testing officers who collected and forwarded the information.

Fodder Conservation Competition

PYRAMID HILL DISTRICT

Report of the Judge—A. MORGAN, B.Agr.Sc., Irrigation Field Officer

THE Pyramid Hill District Fodder Conservation Competition was held recently under the auspices of the Pyramid Hill Agricultural Society, and sponsered by the Royal Agricultural Society of Victoria.

Outstanding features of the competition were the preponderance and quality of oaten hay reserves. Acceptance of oaten chaff as the mainstay of winter supplements for dairying and grazing was shown by the excellent sheds built in recent years by several of the exhibitors. Those of Mr. A. J. Broad, Mr. W. A. Broad, and Mr. E. E. Broad were notable examples of planning and workmanship.

TABLE 1.—ACREAGE UNDER CROPS AND PASTURES.

Exhibitor.	Total Area of Farm.	Acreage used for—			
		Lucerne.	Subterranean Clover.	Permanent Perennial Pasture.	Normally Used for Hay-growing.
	acres	acres	acres	acres	acres
C. E. Wood ..	750	25	200	45*	30
W. A. Broad ..	453	17	117	30	40
A. J. Broad ..	440	25	80	..	30
T. Gilmore ..	906	10	118	20	40
E. E. Broad ..	390	..	100	..	40
J. F. Wood ..	306	12	100	15†	20

* Paspalum. † Old lucerne.

While the popularity of Algerian oats is very apparent in the district, a gradual change-over to crops of a more permanent nature and to reserves less subject to damage by pests and vermin may be confidently predicted. Reasons for confidence are that the district is served by irrigation, and also that there is growing appreciation of the greater efficiency of irrigation when applied to improved pastures as compared to "natural" grasses and weeds. Another reason is that a good start has been made, as shown by the survey in Table 1 of the crops grown on the various properties represented in the competition.

At the same time the opportunity was taken to collect data in regard to use of superphosphate and to determine the relation between top-dressing rates and winter carrying capacity. This relation is only approximate, since winter carrying of a property in this district is determined mainly by seasonal conditions. The total quantity of superphosphate used by each exhibitor, and the rate at which the manure is applied to the various crops, is summarized in Table 2.

TABLE 2.—AMOUNT OF SUPERPHOSPHATE USED, AND RATES OF APPLICATION.

Exhibitor.	Total Superphosphate Used.	Rate of Topdressing of—		
		(a) Lucerne.	(b) Sub. Clover.	(c) Natural Pasture.
	tons	lb./ac.	lb./ac.	lb./ac.
C. E. Wood ..	28	186	186	112*
W. A. Broad ..	6	80	80	nil
A. J. Broad ..	8	100	124	nil
T. Gilmore ..	10	112	112	nil
E. E. Broad ..	3	..	93†	nil
J. F. Wood ..	13½‡	186§	186§	..

* 40 acres only. † Every third year. ‡ Average of six years § Every second year.

A classification of the stock in each case was made, and the winter carrying capacity is shown in Table 3 on the following page.

TABLE 3.—CLASSIFICATION OF STOCK TO BE CARRIED DURING WINTER.

Exhibitor.	Cows and Cattle.			Sheep.	Horses.		Total Stock Units.
	Milking Cows.	Dry Cows.	Young Cattle.	Ewes (with lambs).	Draught.	Light.	
C. E. Wood ..	25	38	13	nil	4*	4	76
W. A. Broad ..	14	11	7	281	3	4	51
A. J. Broad ..	12	4	19	280	5	2	74
T. Gilmore ..	28	3	66	110	3	..	84
E. E. Broad ..	15	..	30	220	5	1	70
J. F. Wood ..	12	..	6	500	3	..	91

* A team of six draughts brought in occasionally from another property.

From the foregoing tables, although admittedly in some respects they give approximations only, it is permissible to make some interesting comparisons in regard to superphosphate used, area, and winter carrying capacity. These are summarized in Table 4—

TABLE 4.

Exhibitor.	Area (Total).	Total Winter Carrying (Stock Units).	Winter Carrying per Acre (Stock Units).	Super. per Acre (Total super.) Total Area.	Proportion of Farm sown down to Permanent Crops.
	acres			lb./ac.	
C. E. Wood ..	750	76	·10	84	·36
W. A. Broad..	453	51	·11	30	·36
A. J. Broad ..	440	74	·17	41	·24
T. Gilmore ..	906	84	·09	25	·16
E. E. Broad ..	390	70	·18	17	·26
J. F. Wood ..	306	91	·30	98	·41

From Table 4 the significant conclusion drawn is that the property with the highest winter carrying capacity—that of Mr. J. F. Wood—has the highest proportion of permanent crops and has received the heaviest top-dressing, while the lowest winter carrying is shown on the property with the lowest proportion of permanent crops and with the second-lowest rate of top-dressing. The position occupied by Mr. E. E. Broad's property, where top-dressing rate is low and the proportion sown to subterranean clover is high, is surprisingly good, possibly due partly to the subterranean clover and partly to the high proportion of hay-growing land.

Subterranean clover, stored as hay or silage, was second to oaten hay in popularity. The soil over the greater part of the area inspected during the judging is not first class as far as lucerne-growing is concerned, while the irrigation facilities are at present entirely unsuitable for wholesale adoption of perennial permanent pasture mixtures. Certain areas receiving drainage water or otherwise favourably situated for extra waterings are carrying *Paspalum dilatatum,* which in some cases is being top-dressed to encourage the growth of white clover and strawberry clover, but these patches do not appear likely to encourage further expansion by sowing. Reasonably good grazing lucerne can be grown, however, particularly if drainage, top-dressing, and intelligent grazing methods are thoroughly attended to, and with such treatment it can be expected to last for several years. Subterranean clover, requiring less irrigation than perennial species, offers the best possibilities on the relatively shallow soil with limited irrigation supplies; it has been more extensively planted. None of the exhibitors, as shown in Table 2, have in the past carried out any top-dressing at the 2-cwt. per acre rate which experiment has shown to be desirable for subterranean clover. The position is now more serious, since those farmers who were becoming more certain of the benefits of manuring, and likely to increase their top-dressing rates, now find a profitable investment closed against them, due to the superphosphate shortage. The alternative, which is not as easy as top-dressing, is to devote more attention to grading and lay-out, to get the best results from areas where superphosphate, subterranean clover, and water are being used.

While subterranean clover possesses, in its longer season of active growth, an advantage over trefoil and annual volunteer clovers, the development of the latter plants should not be ignored, as these plants also react very favorably to better irrigation practices. In a district where the irrigation supply is restricted the conservation of water need not be left to the engineers while the individual farmer can make a very substantial contribution. By adopting practices which ensure that every acre-foot of water does a maximum amount of work in promoting healthy growth of palatable and nutritious plants, the disadvantages of insufficient irrigation supplies and shortages of artificial fertilizer can be appreciably offset. Good grading, good lay-out, and adequate

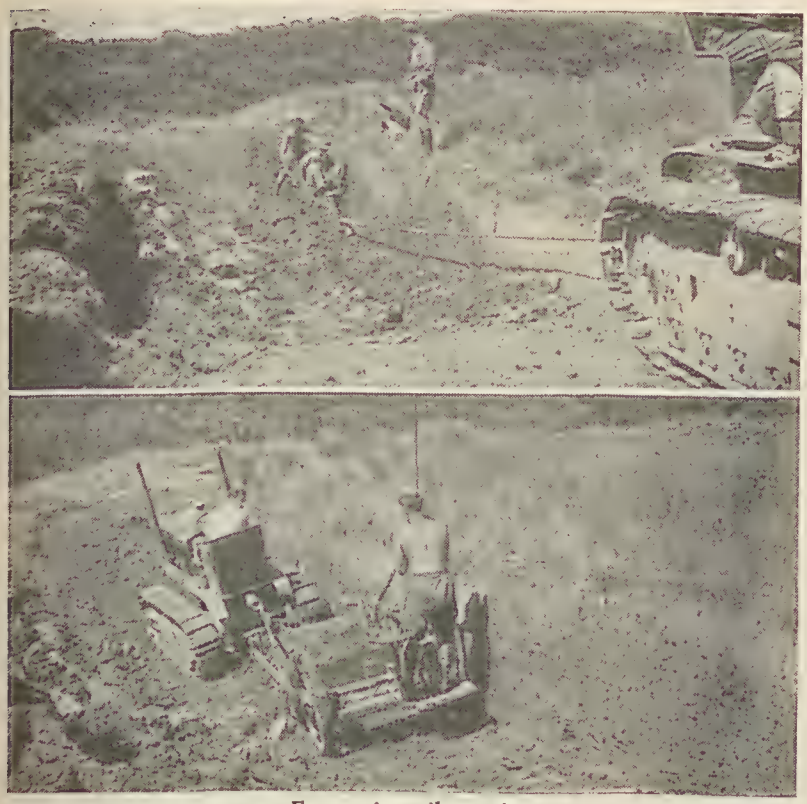
A commodious storage shed giving adequate protection from the weather.

structures for efficient control of the water are the principal requirements. On land of a plain character the tendency is to dispense with the grading and banking, and to use very long checks, because the natural conditions are considered, quite erroneously, to be "good enough." A "good enough" policy usually results in the development of unpalatable, innutritious growths, such as rushes. The position is aggravated where poor structures reduce the control of the water and where areas, over-watered during an irrigation, are later flooded as a result of leaky stops or overflow from weed-filled channels.

In a previous report in connexion with a pasture competition in the district (February, 1942, *Journal*), the advantages of subterranean clover for hay and silage making were discussed in detail, and it is not intended to recapitulate these. Proof of the arguments advanced have been seen this season at Mr. C. E. Wood's property, where baled subterranean clover hay and clover silage form the bulk of the reserves for a large herd of Friesians.

No figures are to hand in regard to the length of time during which well-made silage, pitted in a dry place, will remain in good condition, but it is known that the period covers several years at least. This feature strongly recommends silage as a form of fodder for permanent conservation, as compared with stacked cereal hay, grass hay, or lucerne hay, all of which require special protection from the rain and wind, and are more suitable for conservation for temporary (seasonal) needs. In practice, in irrigation districts, the main aim of fodder conservation is to provide for the winter period, although on the best-improved properties there are now many cases where some hand-feeding of hay is carried on throughout the year, in spite of the fact that the pasturage available is ample in quantity and excellent in quality. The time during which it is absolutely vital to hand-feed is very variable, and depends almost entirely on winter rainfall, especially on the less-improved areas in those districts with low water-rights and/or limited supplies. Hand-feeding may commence in May, or may not be necessary until July, and the irrigationist cannot predict whether he will use his stored fodder or have a surplus for sale or for carry-over to the next winter. Under average conditions the requirement per head may be considerably less than that specified in the conditions of the competition, but the important aspect is that of providing for bad years.

In general, the quality of all exhibits was good, and to a large extent reflects credit on the exhibitors. However, some credit must be given to weather, which was very suitable for hay-making. If any fault could be found it was in regard to the grain, the oats being thin and light. The danger of rust and lodging which attends late irrigation of cereals is mainly responsible for the withholding of water from hay paddocks in spring. Incidentally, this is a reason why the use of cereals as cover-crops for subterranean clover and lucerne



Excavating silage pits.

is not always a successful practice. The early cutting of oats, to secure a better quality chaff, also tends to produce the thin light grain.

Subterranean clover content was rather light in most of the meadow hay, but colour, aroma, and other features of curing were good. With the exception of one old stack of oaten hay, protection from weather, except to run the usual wires over the ridge and to weight them with logs and scrap-iron, had not been attempted. As in most cases the stacks were intended to be chaffed and stored loose in mouse- and sparrow-proof sheds before the winter set in, the expense and labour of thatching was not considered justified. Bag tarpaulins treated with sump oil and tar mixtures are excellent covers for small stacks, but are very heavy to handle for large stacks.

For the same reason as thatching is not usually attempted, no bases were provided for the stacks. In one case irrigation water had gone dangerously close to a stack, but otherwise the risk from irrigation water damage was negligible. Protection from stock was carefully attended to in every case, the favourite fencing material being ringlock cyclone with a plain wire and a barbed wire at the top. Gates leading into stackyards ranged from the rough wire gate to the well-constructed wooden gate. Most yards were free from litter and dead weeds. For economy in handling, and to secure efficiency in chaffing directly from the stack into the sheds, stacks were built close together and in some cases joined together by straw-heaps. This arrangement, and close proximity to engines, sheds, and in some cases houses, might be considered bad practice in regard to fire risk, but this risk was minimized by the shortness of the period it was intended to leave the hay in the sheaf.

Baling appears to have gained in popularity, and, particularly on properties with limited shed accommodation, the system has many advantages for storage, transport, &c. The cubical content of meadow hay is reduced to one-third or less by pressing, and means more compact storage and covering. Extravagant claims are sometimes made in regard to the moisture content at which baling can be undertaken. However, heated bales, which later develop mouldiness, cannot be considered the equal of dry, sweet, pressed hay, and the work is best undertaken with just sufficient moisture to prevent loss of leaves and undue breaking up of stems, &c.

Grain reserves intended for pigs and milking cows were in most cases already crushed, or were to be crushed at an early date. The greater part of the crushed grain was stored in tanks, old mine boilers stood on end, or in hoppers built into milking sheds.

The Awards.

Details of the points awarded in each section are set out in Table 5, showing Mr. C. E. Wood as the winner with a total of 183 points out of

a possible of 200 points. Mr. Wood obtained high points for "Quantity and Quality of Fodder," not only on account of quantity and quality, but because of the excellent variety, including material suitable for both temporary and permanent reserves. Being exclusively a dairying property, the value of the extensive storage of silage (approximately 130 tons) is obvious. In every section the exhibit scored well, except in the case of green crops, and this was due to the fact that subterranean clover paddocks were not started off by watering at the time of judging. This applied to all the exhibitors. Baled subterranean clover hay formed the bulk of the remainder of Mr. Wood's reserves, and totalled 1,000 bales estimated to weigh 35 tons. Except for one small stack of bales, these were protected by temporary roofs, sheds, &c. They had been very nicely cured, and showed a high content of fine, leafy subterranean clover of attractive colour and aroma.

The silage pits were straight-sided and 5 feet in depth, with the following dimensions:—60 feet x 12 feet, 33 feet x 14 feet. The method of filling was to load the greenstuff on a four-wheeled trailer accommodating about 1½ tons, using one horse. On arrival at the pit two horses were hitched to ropes laid crosswise over the floor of the trailer, and the material was pulled off into the pit from the side. Experience has shown that the silage can be built to 8 feet above ground-level, and that after sinking has taken place the ends can be built up with earth, using a scoop. When these are completed the team can be driven up and over the silage to cover it with about 9 inches of soil. Half the contents of the large pit was a residue from the previous season.

Two stacks of new oaten hay, and a three-year-old stack of straw, together with a supply of barley stored in a tank handy to the pig-pens, completed the reserves. A large quantity of skim-milk has to be handled in feeding the pigs, and a very satisfactory system of pipes and convenient taps reduced labour to a minimum.

TABLE 5.—PYRAMID HILL FODDER CONSERVATION COMPETITION, 1942.

Exhibitor.	Quantity and Quality.	Green Crops.	Excess.	Suitability.	Condition of Stock.	Location.	Protection.	Total.
Possible Points ..	80	10	60	15	10	10	15	200
C. E. Wood ..	77	5	54	14	9½	9½	14	183
W. A. Broad ..	70	5	20	9	9½	9½	9	132
A. J. Broad ..	70	5	12	10	9½	9½	9	125
T. Gilmore ..	70	1	12	10	9	9	13	124
E. E. Broad ..	70	3	3	9	9	9	10	113
J. F. Wood ..	60	5	..	10	9½	9	11	104½

CHEESE RESEARCH

Cheese manufacturers may be interested to know that an investigation is being carried out at the Department's Dairy Research Laboratory at Werribee on vacuum pasteurization of milk for cheesemaking. The experiments have been designed to compare the effects of pasteurizing milk in an ordinary flash pasteurizer with those of pasteurizing in a modern direct-steam vacuum pasteurizer of the type used in butter factories for treating cream for buttermaking. Special attention is being devoted to the relative effectiveness of the different treatments with respect to removal of feedy and other taints from the milk, destruction of bacteria and enzymes, effects upon cheese yield and total effect upon cheese quality.

Dairy companies desirous of obtaining information on this subject are advised to communicate with the Chief Dairy Research Officer, Dairy Research Laboratory, Werribee.

[*Continued on page 300.*

The Handling and Treatment of Dairy Produce

By A. F. BOTTOMLEY, Dairy Supervisor

A well-lighted, well-ventilated milking shed.

THE main factors in the production of choicest grade dairy produce are healthy cows and cleanliness in all dairying operations. Water, dairy, cowshed, surroundings, and the methods used in handling the cows should all be scrupulously clean. Combine these factors with coolness for the product, and the ideal environment will be obtained.

The main causes of waste and loss in value in milk and cream are, to a certain extent, held in check during the cold weather. The chief cause of deterioration is bacterial contamination. Bacteria are introduced to dairy produce chiefly by dust, flies, and filth—the two latter usually being associated. The lactic acid bacteria, which cause "clean scouring," will be largely controlled by keeping the milk and cream at low temperatures. Their speed of growth increases as the temperature of the product rises.

When milk is drawn from a healthy cow it is practically free from germ life of any description, but is at an ideal temperature for feeding and breeding bacteria.

Pathological factors also can adversely affect the product; for example, contagious abortion and mastitis. The latter is the most common disease of the udder, causing a high degree of bacterial contamination and spoilage. Many farmers are far too tolerant of "three teaters" and those cows with mild thickenings and abnormalities of the udder. Any cow, whose udder, when milked out, is not free and pliable, should be suspect. At the commencement of milking each cow it is easy to see whether the milk has any pus or clots in it, or has a watery appearance. At the same time it should be remembered that cows with a mild form of mastitis may produce milk apparently normal. The udders, therefore, should be frequently handled by the operator, and any abnormality should be promptly reported to the dairy supervisor or stock inspector, whereupon it will be investigated.

Testing a cow for mastitis before milking.

The Handling and Treatment of Milk.

Every year large quantities of milk and cream are graded back from choice to first quality because of their "metallic" content. This waste can be easily controlled by preventing direct contact with base metals of dairy equipment (copper, brass, and iron).

Provided the herd is healthy, it may be asked what and where are the other sources of contamination. Probably the greatest number arise in the cowshed. One of the most common is a dirty udder. This should always be properly washed, and the method recommended is as follows:—

Take lukewarm water that has been boiled; add a little soap powder or any odourless soap (this water should be changed frequently). Take a piece of clean cloth about 16 or 20 inches square. Wash the teats, udder, and flank thoroughly; then wring the cloth out and dry the parts washed.

Dirty cloths, water, and hands are all common sources of contamination. The milker should wash or rinse his hands between milking each cow, and always *after* completing the leg-roping. Dirty leg-ropes and stools, greasy bail-rails and push-rods on the doors are other frequent sources of contamination. It is advisable to substitute chains for leg-ropes. Bars, stools, and door push-rods should be scrubbed frequently. The holding of milk in the shed during milking is a very bad practice because bacteria, as well as being water-borne, are also dust-borne; they can literally float in from a dusty yard. An organism known as *Bacillus coli* is always present in manure. With large frontal yards, not kept scrupulously clean, every gust of wind will bring waves of bacteria into the shed. That is one of the reasons why this Department advocates that the main yard should be on the end of the shed, with a small concrete holding yard in the front. The milk when drawn must be removed to a detached dairy, well lighted and ventilated, with a sweet atmosphere. The Department strongly advocates the use of a cowshed open to the east or the north, so that the sunlight can reach all parts of the shed. The direct rays of the sun have a germicidal effect. Even the tubercle organism, which is particularly hard to kill, will be destroyed by three minutes' exposure to direct sunlight. Over a period of many years the Department has found that there is a larger percentage of tuberculosis reactors on farms with enclosed cowsheds than those with sheds open to the sunlight and air.

The Department requires and enforces the cooling of milk immediately after it is drawn from the cow—the temperature most favouring the growth of putrefactive organisms. A reduction in temperature to 60 deg. Fahrenheit essentially means less germs in a given time, and may well make all the difference between a milk saved and a milk spoilt. What farmer, therefore, can doubt the advisability of quickly taking the heat out of the milk? This can be achieved only by cooling over an approved water cooler. Cooling has another advantage, inasmuch as it aerates the milk and helps to remove "feedy" and "weedy" flavours. To use a cooler effectively, the water must enter from the bottom of the cooler so that the coolest of the milk will pass over the coldest water. In estimating the water storage requirements, 5 gallons of water should be allowed for every gallon of milk. Unfortunately if cooling is done in the wrong environment it can actually cause harm to the product. Even where careful sterilization has been

practised the first milk over the cooler has a high bacterial count, indicating that, even in good clean premises, a degree of recontamination of utensils takes place between milkings. This can be obviated by re-washing prior to cooling. The exposure of the milk in a thin film over a cooler tends to remove flavours caused by volatile constituents of certain foods. But owing to a certain peculiar quality milk possesses to absorb and adopt smells and flavours, the inverse action can take place; that is, if milk is exposed over a cooler in a room where oily fumes or other smells penetrate, it will absorb them. Milk has even been known to absorb the odour of a lemon-scented gum tree growing outside a dairy. This is the reason why the Department insists that no engines, oily vacuum pumps, or engines of any description shall be in the milk-cooling room or separator room. Yards also, if near this room, must be kept clean, and precautions should be observed to prevent dust being blown into the room. In setting up the cooler it should be braced well away from the wall so that it is easy to dismantle. It should not be set up where direct rays of sunlight can fall on the milk during cooling. The action of direct sunlight has an injurious effect on milk, causing it to develop an objectionable "cardboard flavour."

Cleaning teats and udder preparatory to milking.

Sterilizing Utensils.

Washing with hot water and soda will remove the grease, but will not kill the bacteria. Heat, if applied in sufficient strength, will kill most organisms, but only if the grease is removed first. The following is the most effective procedure:—

(1) Scrub the utensil externally and internally in lukewarm water, making sure all dirt and milk are removed.

(2) Wash in hot water (about 120 deg. F.) with washing soda added to soften the water and dissolve the grease.

(3) Rinse in hot water to remove the soda solution.

(4) Sterilize by direct steam under pressure for two minutes, or by immersion in *boiling* water for five minutes.

Neither of the two methods of applying heat is of any use unless the grease is removed first. The use of a boiler is the quickest method, but the dairy copper will perform quite an efficient job on the small farm if it can only be kept boiling throughout the sterilizing procedure. In using steam, it should always be remembered that steam is of no use as a sterilizing agent if allowed to escape in the open air; it must always be confined. Buckets, cans, and vats can be placed over a steam jet, but separator and strainer parts require a cabinet or enclosure. A raised stand covered by the vat may be used; but, for instance, to try and sterilize a cooler by steam from a pipe, as is sometimes attempted, is quite useless. Neither is it possible to sterilize a cooler without first emptying it of the contained water. At the completion of sterilizing, a utensil should be so hot that it cannot be held by the naked hand. If then placed on an open metal draining rack it will, by its own heat, quickly become dry. This is important, because bacteria cannot multiply without moisture. The possibility of recontamination of sterilized

dry utensils prior to use is very remote if they are protected from flies and dust. On the other hand, however, no matter how much heat is applied, the utensil will become recontaminated during the day by air-borne organisms if left greasy and wet.

The next consideration is the disposal of the milk. It would be foolish, after observing all the foregoing precautions, if the milk were not disposed of as quickly as possible to dairy, depot, or cheese factory, as the case may be. The transporting vehicle must be clean and covered with a canvas, allowing at least 12 inches of air space between it and the cans. Provided clean bags are used, it is quite a sound practice to wrap wet hessian around the cans. During the hot weather the milk should not be retained on the farm overnight, but, after cooling, should be straightway delivered, if at all possible. With the exception of the returned empties, the farmers' responsibility now ends. In regard to the returned cans, while it is the factory manager's responsibility to have the cans washed, it should be remembered that they are transported over dusty roads and exposed to heat, and therefore they should always be rewashed and sterilized by the farmer prior to use.

If the milk goes to a retailer, it is his responsibility to ensure that the milk is processed and delivered as expeditiously as possible, and in such a manner as to ensure that no further contamination will take place. As for milk for cheese, no matter how careful a cheesemaker is, he cannot make good cheese out of bad milk. As far as the retailer is concerned, the biggest single factor in preventing further spoilage is temperature. When milk is reduced to 40 deg. F., in twelve hours, so slow is the rate of growth that the bacterial growth is almost entirely arrested. There is one method only of reducing milk to that temperature, and that is by brine cooling. Quite apart from its advantages from the hygienic viewpoint, it is always advantageous for the retailer, in that it increases business. This increase is not all necessarily gained at the expense of other traders, because customers, finding that the milk keeps better and tastes sweeter when cooled by this process, increase their orders, thus raising the quantity of milk consumed per head during the hot weather. Prior to brine cooling, the quantity of milk sold used to drop during the summer.

The retailer, like the farmer, has a big moral responsibility in supplying milk in good condition, apart from his legal responsibility, as milk is the principal food for infants, the sick, and the aged. The goodness of the product will depend largely on the degree of sterility obtained with his utensils, in addition to storage methods. The brine cooler can be a heavy source of contamination unless thoroughly washed and sterilized. Cans and bottles, measures and stirring-rods are all equally important. Carts should be kept clean and well covered so that the cans are well protected from the sun, and the milk should be delivered as early and as quickly as possible. The practice adopted by some retailers, for reasons of expediency, of cooling milk back into the farmers' cans is a risky one, and indicates a lack of moral responsibility to the public. The system existing in some cases of delivering milk in uncapped bottles, and from objectionable hand cans, cannot be described as creditable or hygienic, and leaves much to be desired.

Tuberculin Testing Extended to Country Districts

In pursuance of the Departmental policy to extend gradually to country districts the tuberculin testing of dairy cattle which has already been undertaken in the metropolitan area, Departmental Veterinary Officers have recently concluded the tuberculin testing of all cows in herds supplying milk to the cities of Bendigo and Warrnambool.

In Bendigo 2,172 head of cattle in 86 herds were submitted to the tuberculin test and 29 animals (1·3 per cent.) gave a positive reaction to the test and were destroyed. The owners of these animals were paid compensation to the amount of £253 10s.

In the Warrnambool district 445 head of cattle in fourteen herds were tested and 26 animals (5·8 per cent.) gave a positive reaction and were destroyed, the amount of compensation paid to the owners being £247 5s.

OLIVE CULTURE

By R. ROBERTS, Orchard Supervisor

HAVING been responsible for the drying up of olive oil imports into Australia, the war has given the olive-growing industry here a golden opportunity for development and expansion.

The industry in this country was never extensive, although it has its origins in the days of early Colonial settlement. Prior to the war, overseas competition by cheap oils produced in the Mediterranean area, restricted development. However, if the present opportunity is seized, the industry may be placed on a footing from which, after the war, it may not readily be displaced.

Australian oils are of excellent quality, and on that score the industry has nothing to fear from the imported product. It is in the cost of production that any future danger will lie, but there seems to be no reason why the protection afforded other Australian products, should not be applied to the olive-growing industry. Given this protection, there is every reason to believe that Australia could ultimately become independent of overseas supplies of olive oil.

In the Murray Valley the industry could be expanded as a valuable adjunct to the dried fruits industry, by planting trees within the environs of the cities and towns of the north-west. To judge from the treatment olive trees already growing in these areas receive, it speaks well for their vitality that they produce such satisfactory crops. With a little care and attention to cultural practices, the growing of olives for oil extraction alone should prove most profitable, but when coupled with pickling will open up avenues for post-war development, and provide work for a large number of people.

Prior to the war, nine-tenths of the olive oil used in Australia was imported from Spain, France, and Italy. Pre-war prices for olives delivered to the factory for oil extraction ranged from £9 to £14 per ton. The wholesale price of oil was in the neighbourhood of 13s. 6d. per gallon. During the past season, however, the price paid for olives for oil extraction was £14 per ton, and £18 per ton for hand-picked fruit for pickling. The wholesale price of olive oil ranged from 28s. to 30s. per gallon.

Olive trees have been known to live for centuries. This ancient tree is growing in the Garden of Gethsemane.

The olive tree is a native of Asia Minor and Africa. It may be grown over a wide range of soils and climate. Even when neglected it will produce some fruit, but a little attention given to general requirements will more than repay the grower of this valuable tree. Being shallow-rooted and needing little in the way of plant foods, it is a tree which should appear more frequently in our parks and gardens.

The following notes may help intending growers to avoid some of the mistakes usually made when a new industry is started or an old one expanded.

The Planting Site.

The main factors to be considered when establishing an olive grove are climatic conditions, moisture requirements of the tree, soil types, and distance from market or factory.

The olive thrives best in hot dry climates, and while it will live where protracted droughts occur, it is as dependent as other fruits on an adequate water supply.

In the irrigation areas along the Murray River Valley, where summer temperatures are high, the winter is mild and the average rainfall is not more than 12 inches, and where frosts are not experienced until late in the autumn, ideal conditions exist for the growth and productiveness of the tree.

Although able to withstand high temperatures, a temperature below 28°F. will usually injure the fruit, and still lower temperatures may have an ill effect on the tree itself. It is advisable, therefore, not to plant in what may be termed recognized frost pockets.

The olive does not blossom until the spring frosts are over, but as the fruit ripens late in the autumn, there is some danger to the fruit from frost. This does not mean that the crop is a total loss, as frosted olives can be processed for oil extraction.

Soil Types.

The belief that the olive will grow and produce fruit where no other tree would thrive is incorrect, for, while it will grow on many types of soil, even on salt patches, it prefers a good sandy, gravelly, or even a clay loam, providing it is not too rich in humus or nitrogen. An excess of humus or nitrogen in the soil will result in excessive wood growth at the expense of fruit production.

The trees are naturally shallow-rooted and do not need the depth of soil required by deeper rooting trees.

Varieties.

At the present time, most of the olives grown are used for oil production only, but attention also should be paid to the more profitable industry of pickling, and only trees which produce large fruits should be planted. The fruit from these trees could be graded, the larger fruit being used for pickling and the smaller for oil extraction.

This Verdale olive tree yielded 1 bushel of fruit as a four-year-old.

As there are some 40 or 50 olive varieties, it is possible in this article only to deal with a few of the more outstanding.

The **Mission** variety is a dual-purpose tree. It makes satisfactory growth, is a prolific bearer, and produces a medium sized, oblong fruit, jet black in colour and of a good flavour. The fruit can be picked green or ripe for pickling. It is also a good olive for oil.

The **Manzanillo** bears a larger fruit than the Mission variety and ripens earlier, but the fruit must be handled carefully. It is roundish oval in shape, of a dark purple colour, and may be picked green or ripe for pickling. The tree is a good bearer and a vigorous grower, inclined to be broad and spreading. The fruit ripens about mid-April.

The **Spanish Queen**, which may be synonymous with Sevillano, is one of the largest olives grown and much sought after for pickling. The fruit ripens early.

Lucca, medium in size, heavy bearer, high percentage of oil.

Verdale, medium size, suitable for oil and pickling.

Correggiola, crops heavily, suitable for oil, and does well under irrigation.

Other payable varieties on account of the size of the fruit and regular bearing habits are **Macrocarpa, Ascolano, Bouquettier,** and **Hardy's Mammoth.** The last-named variety produces a large, dark, oval-shaped fruit, of good flavour, suitable for canning, pickling, or oil, but it is somewhat irregular in bearing.

Olive varieties:—
1. Mission. 2. Manzanillo.
3. Verdale. 4. Correggiola.
5. Black Italian.

Propagation.

The olive may be propagated from seed, but seedlings do not come true to the parent, and would have to be worked over to the desired variety.

Cuttings from terminal branches may be used. These cuttings are about 4 inches long and are placed in a sand bed in a bush house until roots are formed. The most simple and satisfactory method is the use of hardwood cuttings, known as truncheons. These cuttings are taken from small limbs or branches and are about 12 to 15 inches long. The truncheon is placed horizontally in a trench and covered with soil to a depth of from 3 to 4 inches.

In the following year, dormant buds in the undergrowth side will have started to grow a root system. When this occurs, cut into sections and plant out. It is possible to have two or three trees from one truncheon, and these should bear fruit in about five years.

Another method of propagation, which has been used for centuries in all olive-growing countries, is to take advantage of the excrescences or rounded growths formed on the trunks of old olive trees after they have reached a certain age. These swellings, or trunk tumours, contain not only dormant buds but root initials as well. From the point of view of vegetative propagation, the presence of latent root initials in the old wood explains the successes reported, as the result of planting old stems.

Though the grafting of olives on to seedling root-stocks to obtain a deeper rooting system is sometimes advocated, recent studies have shown that the seedling stock merely serves as a nursery until the scion has rooted, and this shallow root system persists throughout the life of the tree.

Planting Distances.

The olive is naturally long-lived, and if given proper attention will grow to a large tree. In a grove, trees should be planted not less than 30 feet apart each way. Planted closer than this olive trees have an undesirable tendency toward upright growth because of insufficient light.

For the first few years, provided ample water is available, the grove could be interplanted with other fruit trees, such as apricots, peaches, &c., without restricting the growth of the olives.

Where the trees are planted in rows as break-winds, they may be planted much closer, about 15 feet being the usual distance.

Pruning.

The olive bears its fruit on the growth made in the previous twelve months, and unless this fact is borne in mind when pruning the crop will be disappointing. The object of pruning, therefore, is to stimulate this yearling growth, to keep the centres of the trees open for light and the free circulation of air, to remove unnecessary cross branches and spent wood, and generally to grow a tree from which the fruit can be harvested economically.

Production and Profits.

While the production from individual trees may be high (as much as 5 cwt. of fruit has been taken from a small tree in the Mildura district), the average yield is much smaller. This applies to any fruit trees grown for profit, and is due mainly to small undersized trees and lack of good cultural practices.

Although any olive may be processed for oil extraction, only large well-grown fruits are pickled, and these should be hand picked. The

Butt of an olive tree aged about 50 years.

amount of expressed oil per ton varies considerably, due, in some instances, to climatic conditions and the degree of maturity when picked

The oil content per ton of olives also varies according to the variety being processed, and ranges from 10 to 40 gallons per ton, the average being about 30 gallons. The output from the Mildura factory is approximately 2,000 gallons per year.

Harvesting.

Methods of harvesting have not changed greatly since ancient times. When the bulk of the fruit of a particular variety has reached maturity, hessian sheets are spread on the ground under the trees and the branches are tapped smartly with a long pole, causing the ripened fruit to fall. The fruit is collected on to one sheet, all small twigs and leaves are removed and the fruit is placed in sacks, ready to be carted to the factory. Care must be exercised in the use of the pole, otherwise branches may be broken, and fruiting wood may be damaged.

The branches should be struck "with the leaves," i.e., in an outward direction and not against them. Striking against the leaves is an easier way to knock the fruit off, but more damage is done to the tree. The pole is used where the fruit is to be treated for oil extraction, but fruit for pickling should be picked by hand, as mentioned previously. Where the fruit is intended for oil extraction, it should not be allowed to become over-ripe, as the oil from over-ripe olives contains an excessive amount of solid fats and tends to become cloudy and solidify in bottles or cans.

Harvesting Costs.

On an average crop, one man will pick from 2 to 2½ cases of pickling olives per day. As the value of the fruit is approximately 25s. per case, there is a fair margin of profit. On the other hand, where the main crop is to be processed for oil, a team of three men using poles would knock down and bag, ready for the factory, approximately 10 cwt. of olives per day. This work is usually carried out on a share-for-share basis, the owner taking as his share half of the fruit delivered to the factory.

Oil Extraction.

Olives are subjected to three pressings. The press is a rack and cloth press, similar to an apple press, either hydraulic or gear driven, with a pressure of from 400 to 500 lb. to the square inch. In the first pressing, all the juice is extracted from the fruit and a small amount of oil. This oil is known as "virgin oil," and is very superior in flavour and general quality.

In the second pressing, all the pulp is thoroughly crushed and some of the stones broken. The pressure is approximately 1,500 lb. to the square inch. The mixture of oil and juice is collected in a tank beneath the press and is pumped into settling tanks.

Harvesting olives.

In the third pressing, a small amount of oil is obtained from the flesh and seeds, but seed oil is inferior in quality and contains properties which hasten rancidification, and is not mixed with oil from the first and second crushings.

The method of oil extraction commonly used in Australia is slightly different from the foregoing. The fruit is tipped into a feed hopper and is carried upwards in a canvas cupped belt to a machine called a disintegrator, which breaks the fruit. As oil from leaves and twigs would taint the oil from the fruit, these are removed by a blower before the fruit reaches the disintegrator.

Olive trees used as a dividing fence and windbreak.

After this primary crushing, the fruit is carried forward to a grinding mill, which grinds and crushes the stones and fruit into a pulp. This pulp is then ladled into press cloths and transferred to the hydraulic presses and subjected to a pressure of 3,000 lb. to the square inch.

Freshly expressed oil contains a fair amount of bitterness, which is soluble in water, and can be washed out either by spraying water heated to a temperature of 90 to 100 degrees F. on to the surface, or upwards through the oil.

The mixture of oil and water is allowed to settle for ten or twelve days and the oil is then "racked off." Before storage, the oil is filtered to remove water and solid impurities. This is done by allowing the oil to percolate slowly through linen bags. As fresh oil is not pleasing to the taste, it should be allowed to "age" for about six weeks before bottling or canning.

In the factory, too much stress cannot be placed on sanitation, as the oil absorbs flavours and odours readily, and once absorbed they are hard to eradicate. Press cloths become rancid very quickly unless kept scrupulously clean, and the floors, bins, conveyors, and filters must be kept free from rancid oil. The floors should be washed frequently with hot sodium carbonate solution to remove rancid oil and decaying vegetable matter.

Pickling.

No article on the value of the olive industry would be complete unless some reference were made to the pickling of green and ripe olives.

In ancient times, olives were pickled in a crude way with salt, or were treated with wood ash to remove the bitterness and to preserve them.

The methods now in use are of comparatively recent development, but the object is the same. Unpickled olives are intensely bitter and European chemists contend that this is due to a glucoside which has been given the name of "Oleuropein." This bitterness may be destroyed by dilute alkali solutions at room temperatures, and it was found that neutralization of excess alkali did not result in the return of the bitterness, once it had been destroyed by the alkali.

The first step in the pickling process is the destruction of most of this bitterness, which is done by steeping the olives for about 24 hours in a lye solution—1 ounce of caustic soda to 1 gallon of olives. This solution must not be too strong, and the dipping must not be too prolonged, otherwise all the bitterness will be removed, resulting in a weak, flavourless product. The fruit should be removed from the lye solution before the lye reaches the pips. This leaves a small amount of untreated flesh, which imparts a pleasing flavour to the finished article. When this stage is reached, the olives are removed from the lye solution and covered with water, which should be changed several times daily, for about a week.

The treated olives are stored in barrels, in a 9 per cent. brine solution, where fermentation takes place, and afterwards packed in glass jars, with the brine in which fermentation took place, and which has been brought to a 10 per cent. solution by the addition of more salt.

Cultivation and Irrigation.

As the olive is shallow-rooted, one fairly deep ploughing, followed by light surface harrowings, to keep down weed growth and conserve moisture, is all that is necessary. Ploughing should be finished about three weeks before blossoming.

The first irrigation should be given two or three weeks before the blossom appears, the second when the fruit is about half-grown, and the third, when the fruit is full grown. The multiple furrow system, where the whole surface can be wetted quickly, is preferable to the single furrow system, which takes longer to thoroughly soak all the surface soil, which should never be allowed to dry out and bake or crack.

Pests and Diseases.

Fortunately, the olive is very free from pests and diseases, and the olive scale, *Saissetia olea*, is the only insect pest of importance. This scale attacks the leaves and twigs only, and is rarely seen on the fruit.

Red Scale (*Aonidiella aurantii*) has been found attacking leaves, twigs, and fruit, but only when the olive trees are growing in close proximity to an infested orange grove.

Where either of these two insect pests are noticed, a thorough spraying with white spraying oil should be given—1 gallon of oil in 50 gallons of water. This spray should be applied as soon as the fruit has set, or after the crop has been harvested.

Two fruit rots affect the fruit; a dry rot causes some trouble in the pickling process, and the wet or soft rot, which does not appear until the fruit begins to ripen. Losses from soft rot can be averted by early harvesting.

By-products.

After the oil has been extracted from the fruit, there remains a valuable by-product in the oil cakes which come from the presses. Pig breeders who have used this oil cake in a balanced ration, claim that sows experienced no difficulty in farrowing and their pigs were very free from scaly backs.

Poultry breeders could try this cake as a food for laying hens in winter time, but it would have to be used sparingly.

Judging by the weed growth on soil where portions of the oil cakes have disintegrated, it should have some value as a fertilizer, if ploughed into the soil in the same way as vine stems.

CHEESE RESEARCH—*continued from page 290.*

Another problem under investigation at the Dairy Research Laboratory is that of the sudden failure of starter cultures in cheese factories due to bacteriophage attack. Hitherto, the origin of bacteriophages attacking starter bacteria has remained completely obscure but T. M. Jensen, officer-in-charge of the Werribee Laboratory, now reports that he has succeeded in throwing considerable light on this matter. It has been definitely established that the addition of a few drops of rennet extract to a flask of sterile milk which has been inoculated with starter streptococci will often result in the appearance of bacteriophage in the whey from the culture, whereas filtrates from cultures to which no rennet has been added do not contain bacteriophage. Since there are good reasons for believing that the rennet itself does not contain contaminant bacteriophage, this new evidence would seem to indicate either that rennet has the power of setting free bacteriophage from organisms in which it is being carried in a dormant state or that rennet contains a precursor substance which, on coming in contact with susceptible organisms, brings about a reaction resulting in the formation of bacteriophage. Support for the former theory is found in recent work by two American investigators who, in studying organisms responsible for staphylococcal mastitis in cows found that bacteriophages for the staphylococci could be set free by treatment of the organisms with rennet in much the same way as that described above.

An interesting feature of the work at the Werribee Laboratory is that while some strains of starter streptococci have been found to give rise to bacteriophage quite readily when grown in the presence of rennet others have been encountered which cannot be induced to yield bacteriophage even after repeated trials. If the latter type of behaviour should prove to be a permanent characteristic of certain strains of starter bacteria, it should eventually be possible, by selecting from such strains, to supply starter cultures consisting of organisms completely immune from failure due to bacteriophage attack.

Live Stock Notes

Compiled by

A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

More about Wheat and Barley.

WHEAT and barley are the cheapest purchasable feeds for pigs, poultry, horses, and dairy cows, and they may be used wholly or in part to replace such foods as bran, pollard, oats, and maize. For all practical purposes, wheat and barley have similar food values, and may be substituted one for the other on a pound-for-pound basis.

How to Buy Barley.

The cheapest way to purchase barley is in full truck or 50-bag lots direct from the Australian Barley Board, 483 Collins-street, Melbourne, C.1. Board prices are as follow:—F.o.r., country sending stations (Wimmera and Southern Mallee)—feed English, 2s. 7d.; English No. 3, 2s. 8d.; f.o.r., Melbourne sidings—feed English, 2s. 9d.; English No. 3, 2s. 10d. Rail freight is 25 per cent. dearer on 50-bag lots than on full truck loads. Cheaper freight and quicker delivery are advantages to be obtained by purchasing full truck loads.

As a result of the demands made on the Railways Department, due to the present military situation and the shortage of coal, the Department cannot provide trucks for less than full truck loads, and therefore the Board is supplying all orders for less than 150 bags from Melbourne stores.

The Board has large stocks of feed English and English No. 3 to sell, but the stocks of Cape barleys are exhausted.

The Board requires cash with order, and for this purpose a *pro forma* payment of 9s. per bag for feed English and 9s. 3d. for English No. 3 is required for barley supplied from Melbourne stores, or 8s. 3d. per bag for feed English, or 8s. 6d. for English No. 3 from country sidings. For this purpose an advance payment of £22 10s. for 50 bags, £67 10s. for an 11-ton truck (150 bags), or £101 15s. for a 16-ton truck (225 bags) has to be made for feed English from Melbourne stores. This *pro forma* payment may present a difficulty in the purchase of full truck lots, but most farmers should be able to buy and store 50-bag lots. Where possible, small groups of farmers should arrange to buy 16-ton truck loads, and divide it amongst themselves.

How to Buy Wheat.

For stock feeding, wheat is being sold by the Australian Wheat Board, 515 Collins-street, Melbourne, C.1., for 3s. 6¾d. per bushel, Williamstown basis, in full truck loads. The buyer is allowed freight from the railway station from which the wheat is consigned to Williamstown, and is charged freight from the consigning station to its destination. An 11-ton truck load of wheat contains 132 bags, and a 16-ton truck contains 192 bags. The Australian Wheat Board also requires cash with order, necessitating a *pro forma* payment of 10s. 9d. per bag. After the wheat has been weighed by the railways, any difference between the *pro forma* payment and the actual value of the wheat is adjusted between the buyer and the Board. The *pro forma* payment for an 11-ton truck will amount to £70 19s., and for a 16-ton truck £103 4s.

As the Australian Wheat Board will not sell less than a full rail truck lot of wheat, except for local delivery in country districts where stacks are open, the smaller feeders are at a disadvantage unless they arrange with neighbouring farmers to share trucks with them.

The Board will resell a wheat grower's own wheat back to him at a price equal to the advance paid on the wheat, plus a small handling charge.

Wheat or Barley.

Inquiries have revealed that feed barley is being retailed by some merchants for as much as 4s. 11d. per bushel, and ground barley for 5s. 3d. Somewhat similar prices are being asked for wheat. Pig raisers and poultry farmers cannot afford to pay these prices. Although it is not intended to take business away from merchants, farmers should make a comparison between prices charged by the Wheat and Barley Boards, plus delivery costs, and the prices charged by the merchants, in order that they may get their barley or wheat at the cheapest price possible.

The wheat being sold by the Australian Wheat Board for feed purposes is f.a.q., and, therefore, is of superior quality to feed and No. 3 barleys.

In the North-East, Goulburn Valley, Northern, and Northern Mallee districts, wheat will be cheaper to buy than barley, because freight costs will be less. In other districts barley will be a little cheaper than wheat. With barley, buyers have the advantage of being able to buy smaller quantities.

A bushel of wheat weighs 60 lb. and a bushel of barley 50. This variation in bushel weight has to be taken into account when prices per bushel are being compared. When barley costs 2s. 9d. per bushel on the farm, wheat is worth approximately 3s. 4d. Barley at 3s. is equal to wheat at 3s. 8d., and barley at 3s. 3d. is equal to wheat at approximately 3s. 11d.

How to Feed Wheat and Barley.

Wheat and barley may be fed to sheep whole, either in troughs or on hard ground, in the same manner as oats. For feeding to other stock, it is advisable to grind both wheat and barley. Although fowls do not eat whole barley as readily as they do wheat, they relish finely-ground barley which may be used to replace, wholly or partly, pollard, bran, or wheat meal in the mash.

Barley is recognized as a splendid fattening food for pigs, and with skim milk or meat meal, provides an excellent ration. Wheat makes an equally good ration.

For dairy cows wheat and barley also give good results when fed with a protein-rich supplement. A good concentrate mixture is provided for milking cows on dry pasture and hay by the use of the following:—

Mixing five parts of ground barley or ground wheat, and one part of meat meal;

or five parts of ground barley or ground wheat and two parts of peanut meal;

or five parts of ground barley or ground wheat, and three parts of linseed meal;

or five parts of ground barley or ground wheat, and four parts of polly feed.

With green pickings or good quality lucerne hay, it is necessary to add only half of the above quantities of protein supplements to make a balanced ration.

Both wheat and barley are deficient in lime, and therefore ground limestone should be fed with both grains. Three pounds of a mixture of four parts of ground limestone and one part of salt should be mixed with every 100 lb. of wheat or barley fed. When lime is being fed in lick form to horses, sheep, and cattle, a greater proportion of salt is desirable to make the lick more palatable, and as a lick one bag of salt should be mixed with one bag of lime. This lime is not necessary for poultry which receive their lime from shell grit.

Pig and Poultry Production Profitable.

The Boards' prices for barley and wheat are such that pig and poultry farming are again profitable undertakings, and there are few reasons now why reasonably good incomes cannot be made from both industries. The present acute shortage of both pig meats and eggs gives ample scope for expansion in both pig and poultry production, without the likelihood of prices for pig meats and eggs falling below profitable figures. In fact, with such a large number of pork-eating soldiers in Australia, and with egg-drying plants capable of handling any surplus eggs during the spring, it should be profitable to increase both pig and poultry production to the full capacity of available equipment and labour.

Well-shaded sheep yards.

Dairy Cows.

Despite shortage of labour and fewer cows, Victorian dairy farmers have produced as much dairy produce since 1st July as during the corresponding period of the preceding year. Certainly the seasons have been different, conditions this year being very much better in southern Victoria, although worse in the north.

With fewer hands to do the work, more rigid culling has taken place, and many animals, formerly kept largely for sentimental reasons, have been sold. The net result has been fewer cows to milk and feed. In many cases the total production of milk and butter-fat has increased with the reduction in the herds, because there has been more feed for each cow. There is much less work involved in producing 20,000 lb. of butter-fat from 60 cows than from 100 cows. With fewer cows, the rejects, too, will be in better condition, and therefore more valuable as beef.

Dairy Calves.

With rigid and heavy culling, more heifers must be reared for replacement purposes. As bobby vealers are cheap and not required for export, every useful heifer calf should be reared. Methods of rearing calves are explained in the pamphlet, "Dairy Calves," which is available free of cost on application to the Director, Department of Agriculture, Melbourne, C.2.

To ensure rearing all his heifer calves and to reduce work, Mr. C. A. Boyes, Wodonga, reared 40 stud Jersey calves last year on ten foster mothers, which were also stud Jerseys. In each case, Mr. Boyes took the foster mother's own calf away from her and gave her four other calves as soon as possible after calving. With a little patience and mothering during the first three or four days, every cow took kindly to the foster calves and reared them well. Mr. Boyes thus dispensed with the labour of milking ten cows and feeding 40 calves, which was quite a considerable saving when, through inability to hire a man, he and his wife had to milk the remaining 60 cows themselves.

To ensure that the foster mothers produced sufficient milk for the calves, Mr. Boyes fed them as liberally as the other members of his herd.

As many as three calves have been reared on one cow at a time at the State Research Farm, Werribee, and there seems to be no reason why other farmers should not adopt this practice. Where whole milk is sold and calves have to be reared on whole milk and artificial foods, this method of calf-rearing would be particularly useful.

Sheep.

Stud sheep breeders, wool growers, and lamb raisers should now give attention to the ram requirements of their flocks for the coming season. To get the best selection of service rams offering, early application is recommended. Stud masters have now classed their stud rams into various grades, and intending buyers should have their orders for rams listed as early as possible. Sire replacements play a very important part in successful sheep

raising, and proven strains should be perpetuated and not changed. A far too common mistake is made in changing strains of blood without any evidence that any change is necessary.

When selecting sires, breeders should be satisfied that the sheep being purchased are from recognized registered flocks. All stock and station agents should be in possession of the flock books of the following organizations:—The Australian Society of Breeders of British Sheep and The Australian Corriedale Sheep Breeders' Association, Commerce House, 328 Flinders-street, Melbourne; and the Polwarth Sheep Breeders' Association, Temple Court, 422 Collins-street, Melbourne.

More detailed information concerning ram selection will be found in the *The Sheep Industry* book, published by this Department at a cost of 1s. posted.

[N. A. Bowman, Sheep and Wool Expert.]

Pigs.

An arbitrary estimate of pig production and selling costs in Victoria shows that when grain is used in the ration to the maximum extent consistent with accepted feeding practices, all costs, excluding grain, amount to 2½d. per lb. dressed weight of baconers, and that 1 bushel of barley produces 9 lb. of pork, and 1 bushel of wheat produces 11 lb. of pork, which suggests the following formula:—

> Price per lb. of pigs at auction, minus 2½d., multiplied by 11 for wheat or 9 for barley, equals the value of grain on farms ready to feed to pigs.

To obtain the purchase value of grain, freight, and crushing costs—which may be 3d. to 9d. per bushel—should be allowed.

Strong, vigorous piglings do well—note runt in the background.

Buying should be done so as to reduce handling and transport costs to a minimum, because up to 15 bushels may be used in the production of a baconer pig.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry.

As the season for hatching and rearing chickens approaches, poultry farmers should make all necessary preparations to ensure that everything will run smoothly. A small error of judgment often is sufficient to add so much to the cost of the fowl before it commences to lay, that no subsequent egg yield will recover the loss.

Hatching chickens successfully in an incubator depends on a number of factors quite apart from the operating of the machine. Some of these factors are:—The vigour of the breeding stock, their care and management, selection of hatching eggs, storage and care of the eggs before hatching, the time when eggs are set, and incubator management.

Birds selected as breeders should be vigorous, free from diseases and parasites, and well fed and cared for so that they will lay large numbers of eggs suitable for hatching. Breeding from immature or weak stock often will produce weak chickens. In general, the ration recommended for the laying birds is satisfactory for the breeding stock.

Eggs suitable for hatching should be selected from those gathered each day. Only normal-shaped and normal-sized eggs with good smooth shells and weighing at least 2 oz. should be set. The number of deformed chickens and "dead in shell" chickens will be reduced by setting carefully selected eggs. Frequent gathering will help to prevent the necessity for cleaning the eggs. Soiled eggs should be cleaned before being placed in the machine, but it is preferable to have the eggs taken while clean from the nest. Eggs being held for incubation should be stored in a cool well-ventilated room. The length of time eggs may be held and still hatch reasonably well is debatable, but there is no doubt that the fresher they are, the better. It is advisable to use eggs not more than seven days old. For egg production generally, the most suitable months for hatching are July, August, and September.

Before the hatching season starts, the incubator should be examined to ensure that it is in good working order and running nicely for a few days before the eggs are put in. In order to prevent the spread of disease the incubator should be thoroughly scrubbed and disinfected with a good strong disinfectant, such as formalin. Proper sanitation in the incubator and its surroundings should produce disease-free chickens if they have been hatched from disease-free eggs. The instructions supplied by the maker of the machine should be studied carefully and followed closely. Conditions, of course, vary in different districts and in different rooms; therefore, regulations always cannot be rigidly observed, and they must be varied to meet circumstances. To operate an incubator successfully, one should keep in mind the following essentials:—Correct temperature, fresh air, proper ventilation, and moisture.

It is essential that clean, warm, well-ventilated, and comfortable quarters be provided for the chickens immediately they are removed from the incubator. Fresh air, direct sunlight, freedom from excessive heat, cold, or draughts, ample room, and ease of cleaning are some of the important requirements.

One of the most frequent causes of failure and high mortality in rearing chickens is lack of proper sanitation. Brooder floors and runs, and food and water vessels frequently are allowed to get very dirty. It is extremely important that these be cleaned continually, and, also, that food and water be placed in receptacles in such a manner that the chickens cannot walk into them. Dryness and strict hygiene are essential in the control of intestinal parasites, and direct sunlight is of great value as a disinfectant and as a preventive of rickets.

Chickens must not be left in the warm brooder too long. They should be transferred gradually to clean, open-range conditions, where they will receive fresh air, sunshine, and freedom so essential for their best development.

Brooder houses should be reserved for chickens only. They should be cleaned and disinfected at the end of the season and left vacant to prevent the introduction of disease in the following year. Some time before the chickens are hatched, the brooder should be cleaned and examined and any necessary repairs made. It also should be put into operation to get it into working order some time before the chickens arrive.

[H. F. Clinton, Poultry Expert.]

Bees.

At this time of year it is best to leave hives undisturbed. Breeding will have ceased, and if a hive is opened up, the bees will be found clustered thickly together and occupying half the number of combs usually occupied during the active season. This clustering allows the bees to keep up the required temperature. The centre of the cluster is the warmest part, and as the bees are continually changing places, all members receive an equal chance of conserving their vitality. Great disorganization is caused by interference with the cluster during the cold weather.

Bees do not hibernate in winter time, but go into a quiescent state. If the hive is opened little activity would be revealed, but the bees still are capable of lifting up their abdomens and protruding their sting as a means of protection.

Hives may be opened on warm sunny days and, if any colonies are found to be short of stores, full frames of honey should be inserted beside the cluster. It is not a good policy to leave colonies short of stores.

June is the month for overhauling the plant and fittings, and for painting supers, &c. Broken frames should be replaced, and the melting down of old combs should be completed.

[J. W. Thomlinson and W. A. Collins, Apiary Inspectors.]

Winter Feeding of Bees.

Directions for Making Candy.

Pour sufficient ordinary household sugar into a can of very hot water to make a thick syrup. Make sure that all the sugar crystals are dissolved before the syrup comes to the boil, because unmelted sugar burns readily, and burnt sugar is fatal to bees.

A good candy thermometer should be procured and used to keep the temperature below 280 deg. F. Tests should be made frequently while the candy is being prepared by dropping a little of the syrup into cold water (50 to 55 deg. F.). If boiled the correct length of time, the drop of candy cooled in the water should

be hard and brittle; but when placed in the mouth it should soften slightly and become tough.

When the syrup has reached this stage it should be poured immediately on to waxed sheets of paper spread out on a perfectly level table or board. Wooden slats about ¼ inch thick should be placed under the outside edges of the paper to prevent the syrup from running off.

When the candy is almost set, it may be cut with a knife into convenient sizes to facilitate breaking when hard.

The candy should be a light amber colour when cold. If dark it is unfit for bees.

When first made, the candy is hard, glossy, and transparent, but after it stands for a time it absorbs some moisture and becomes sticky and crystalline. This is an advantage, because bees can eat it more readily.

The thin cakes of candy can be placed over the frames and under the regular cover, and in this way provide food for a colony that would otherwise die.

To make candy successfully, slow boiling is essential. If it is difficult to prevent burning of the liquid, try constant stirring and a slower fire.

[W. A. Collins, Apiary Inspector.]

VETERINARY NOTES.

Use of Phenothiazine for Treatment Against Parasites in Pigs.

The Council for Scientific and Industrial Research recently recommended the use of phenothiazine for the eradication of worms in pigs and other animals.

Phenothiazine is a yellowish powder, insoluble in water, and has proved very effective in the eradication of large round worms (*Ascaris*) and nodular worms (*Oesophagostomum*). It can be obtained through most chemists in the form of phenzeen, or in a preparation known as phenovis.

It can be given in the feed, in capsules or tablets. The dose rates are—

For pigs weighing 25 lb.—5 gms. (about ⅛ oz.).

For pigs weighing 25-50 lb.—8 gms. (about ¼ oz.).

For pigs weighing 50-100 lb.—12 gms. (about ½ oz.).

For pigs weighing 100-200 lb.—20 gms. (about ¾ oz.).

For pigs weighing over 200 lb.—30 gms. about 1 oz.).

Pigs should be starved for 18 to 24 hours before treatment.

If phenothiazine is to be administered in the feed, pigs should be confined in a pen with which they are familiar. If a group of pigs is to be treated at one time, sufficient space should be provided at the trough for all animals. Pigs varying greatly in size should not be treated in one lot, and phenothiazine should be offered only when the pigs are sufficiently hungry to consume the phenothiazine and feed mixture at once. The drug should be mixed with three to four times its weight of dry ground feed. If the animals are accustomed to feeding on slops the medicated mixture may be made into a thick mass. Feeding in thin slops should be avoided.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Stallion Parades.

Stallion owners are reminded that, owing to the necessity for the conservation of petrol, the usual schedule of stallion parades cannot be arranged for the coming season.

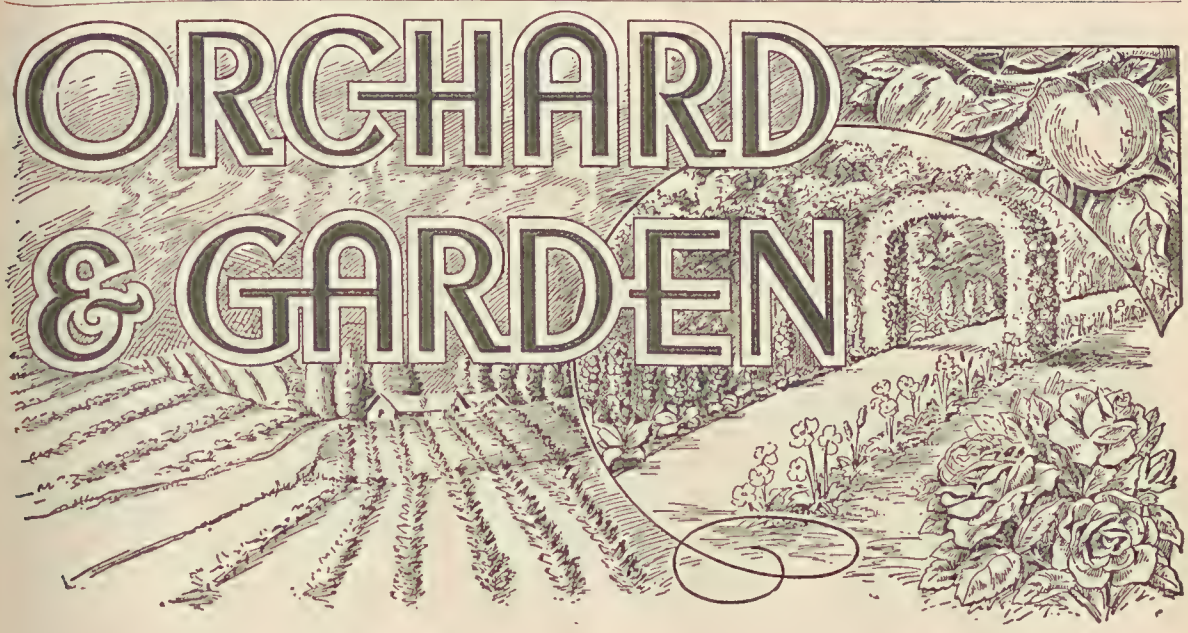
Where possible, arrangements will be made to examine stallions at centres most convenient to those owners from whom applications are received by 1st July next.

Applicants should state which main town would be most convenient for them to present their horses for examination, and in due course they will be advised of the date, time, and place of examination.

If owners forward their applications by 1st July, it is expected that every stallion will be examined as early as in the past and without any unnecessary inconvenience to owners.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

JOIN OR FORM A WAR SAVINGS CERTIFICATE GROUP



In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Liming Orchard Soils.

THE question of liming orchard soils is one which frequently occupies the minds of many fruitgrowers. At the present time there is a shortage of artificial fertilizers, and even the organic forms of manure, such as poultry manure and stable manure, &c., are hard to obtain. Fruitgrowers who are interested in maintaining the vigorous health of their trees are considering the use of lime dressing on their orchards. The only types of soil which directly benefit from such applications are those which are acid. Such soils usually are characterized by the poor type of weed growth they produce. If a soil grows little else but a straggly growth of sorrel and corn spurry, it would usually benefit from liming. Most of the orchard soils in Victoria, except those in the Goulburn Valley and Murray irrigation areas, exhibit these characteristics.

It is of interest to fruitgrowers to know what effects are obtained from the applications of lime to their soil. In the first place, although most orchard soils are acid, no evidence has been obtained to show what state of acidity best suits the growth of fruit trees. For instance, some growers claim that lime is of benefit to cherry trees in particular, but instances are known where cherries are grown on soil which has never received any liming. However, liming has a beneficial effect upon the flora of orchard soils, and this includes both soil bacteria and miscellaneous herbage. One of the most important nutrients from the point of view of tree health is nitrate nitrogen, and it is known that this accumulates most readily in non-acid soils. Leguminous plants, either clovers which occur only during the winter, or green crop plants, such as peas, beans, lupins, &c., grow best in a slightly alkaline soil.

Because these plants contribute to the soil nitrogen, it can be seen that lime applications on orchard soils which are acid ultimately will be of some benefit to the trees. Cases have occurred in which too much lime has been applied to the soil. This has had the effect of reducing the availability of such materials, particularly manganese and iron, but such cases are very rare.

The chief difference between the three types of lime—ground limestone, slaked lime, and burnt lime—lies in the fact that different

quantities of each form are required to produce the same effect upon a particular type of soil. For instance, if a soil required 1 ton of ground limestone, 15 cwt. of slaked lime or 11 cwt. of burnt lime would produce the same effect. The best form of lime to apply is governed, chiefly, by the freight charges, and each grower should work out the cost of having the required quantity of lime delivered at his orchard.

Pruning.

The main task for June will be pruning, and, while engaged on this particular job, growers will have the opportunity of closely examining their trees for the various insect diseases and fungus pests which require attention at this time of the year. The incidence of *Polystictus* and other fungi, such as *Schizophyllum,* seems to have increased during the past few years, mainly as a result of orchardists neglecting to remove dead trees or infected limbs from trees. Such sources of infection should be removed without delay, and, when a large limb is cut from a tree, the wound should be coated with Bordeaux paste.

The trees also should be examined for the presence of San José Scale. The most successful spray for control of this pest is a mixture of 2 gallons of winter oil and 5 gallons of lime-sulphur in 80 gallons of water. This spray is useful for the control of red spider, Bryobia, and Pear Leaf Blister Mite. The eggs of Green Peach Aphis on buds and twigs of peach trees will remind growers that a spray of tar distillate, strength of 1 gallon in 40, will be required in late June or early July for the control of this pest.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

Helpful Hints on Pruning.

THIS season, the labour shortage will cause many amateur gardeners to attempt the pruning of their roses and shrubs. Pruning is a subject requiring a practical demonstration before it can be thoroughly understood, and there are many points the pruner must be familiar with before handling the secateurs. The beginner must bear in mind the objects for which he is pruning. In rose pruning a well-balanced bush is desired which will produce a maximum number of new growths of fairly uniform vigour and able to carry flowers at their tips. In this case pruning is carried out with the idea of *producing new growth,* hence rose pruning is usually rather heavy. All very weak and twiggy growth is removed, and then the framework of the bush is studied, and the limbs to be retained are noted. On these main limbs lateral as well as terminal growths were produced last season, and after flowering in the spring, new growths appeared which flowered in the summer and autumn. Portions of both these types of wood may be retained for next year's framework provided they are strong enough and suitably placed, or more simply, if they have room to grow.

How much of each shoot will be retained depends on the variety and the growth of the plant. Generally from three to five basal buds are retained, and the remainder of the shoot is removed, the cut being made just above a bud pointing in the direction the new shoot is to grow.

Heavy pruning, coupled with generous nitrogenous manuring (e.g., blood manure or blood and bone manure), will generally produce sufficient new growth for flowers, and also an occasional new shoot for framework replacement. Portions of the old framework of both bush and standard roses require to be replaced each year if the flowers are to be well-formed and of good size and if the plant is to continue healthy and vigorous. Where one side of the bush or standard rose is weak, prune the shoots on this side rather more lightly than on the other sides, endeavouring to leave the pruned shoot a little longer than the surrounding shoots. If the growth of some limbs is too upright a wider angle can be obtained by cutting an inch or so above the bud or by cutting to a bud on the opposite side of the limb. The growth arising from the bud in the desired position will then grow at a wider angle, and the top growth may be removed.

On the other hand, if the limb is too horizontal cut to a bud on the top side pointing in a more vertical direction.

Some winter-flowering roses, e.g., Lorraine Lee, should not be pruned at this time of the year. It is better to prune these during February, so that late autumn, winter, and early spring blooms can be obtained when roses are scarce. The rambler roses, Wichuraiana, American Pillar, Dorothy Perkins, &c., are pruned after their mass of spring blossoms is faded. The long trailing shoots which have flowered are removed, and the growth of new shoots for next spring's flowering is encouraged.

The pruning of flowering plum, peach, apricot, and almond trees is done partly while the trees are in bloom, or, completely just after blossoming is completed. All these trees bloom on one or sometimes two or more years' old wood, and therefore pruning must be delayed until spring. It should be completed, however, as soon as possible after flowering so that the growth of the trees is not severely checked.

The aim of the pruner should be to induce new growth, and at the same time restrict the tree's size to suit its situation. If the tree has been allowed to grow too large, it may be cut back hard after blooming, care being taken to space the remaining limbs evenly around the trunk to preserve a balanced tree.

Preparation of Soil.

Prepare the soil for roses and shrubs by deep digging, and if available incorporate some well-decayed manure. Blood and bone manure at the rate of 2 to 3 oz. per square yard can be applied before digging.

Planting of Shrubs.

When bare-rooted shrubs or rose bushes are received from the nurseryman, unpack them at once and examine the root systems. Remove any broken or crushed roots and stand the plants in water over-night. In the morning heel them into soil in a cool, moist place until you are ready to plant. The root system of these plants will have been reduced in lifting them from the nursery, and also in the trimming operation, and it will be necessary to reduce the top growth proportionately. Too many gardeners, anxious to have large plants, omit this top pruning and wonder why the plants take a season or more to establish themselves. This is particularly noticeable with standard roses.

VEGETABLE GROWING.

June can be regarded as a month of preparation in the vegetable garden. The opportunity should be taken to dig in any well-decayed compost, and if a light sprinkling of blood and bone manure at the rate of 1 or 2 oz. per square yard is spread over this material it will improve the fertility of the beds. After digging leave the soil rough, and if necessary apply a light application of wood ashes or lime on the surface.

In warm situations, broad beans and some varieties of peas, e.g., Melbourne Market and William Hurst, may be planted for early crops.

Brown Globe and Brown Spanish onion seed may be sown in a seed-bed or in their permanent rows. If sown in drills space them about 10 inches apart, and do not sow the seed too thickly. If a plant is obtained every 4 inches in the row it will be sufficient. Misses in the rows can be filled in later by transplanting from regions where the plants are too thick.

A useful onion flavouring for stews, soups, omelettes, and salads may be obtained practically all the year round from a few clumps of chives. This member of the onion family grows like a bunch of small spring onions. The plants may be lifted and divided now. For use the leaves are cut and chopped up finely. The clump then produces a fresh crop of leaves which can be used later. When the clump is about 6 or 8 inches in diameter, it can be divided and replanted in fresh soil. This lifting is necessary every two or three years.

ERRATUM

In the article "Ascochyta Blight of Field and Garden Peas", on page 262 of the May issue of the *Journal of Agriculture*, the caption to Fig. 3 should read: "Left: Seed infected with Mycosphaerella Pinodes. Right: Healthy seed".

NOTES FOR THE HOME

PRESERVING ORANGES

By RACHEL M. PEILE, Fruit Preserving Expert

AS vitamin C plays an important part in the daily diet, we should know something about one of its chief sources, namely, oranges, and the many attractive ways this fruit may be utilized. Because they contain important mineral salts necessary to good health, as well as vitamins A, B, and C, oranges should be utilized more and more, particularly during the months of June, July, and August, when they are at their best for flavour, high pectin content, freshness, and cheapness. Because the process of heating destroys their vitamin content to a certain extent, oranges, like most other fruits, are of more value as a food when fresh, but they also have considerable food value when preserved, and six attractive ways of preserving them are given hereunder :—

Preserved Oranges.

Although oranges are not commonly preserved by bottling, they are delicious this way if put up in a heavy syrup. All parts of the orange, with the exception of the seeds, may be eaten just as they are taken from the jar. The peel and pith are saturated with the strong syrup which eliminates all bitterness and the syrup is strongly flavoured with the orange. In this way, nearly all goodness and vitamins are retained. The fruit may be used as a sweet or in fruit salads, or, with the addition of acid, may be converted into marmalade. The syrup may be strained and used for drinks or in fruit moulds.

Select sweet oranges and thoroughly scrub them. Cut into thick slices, and drop into a heavy syrup made by adding 12 oz. sugar to each pint of water. Simmer the slices gently for four minutes, then remove from the syrup and allow to cool. Next, pack them into the jars. Cool and strain the syrup and fill the jars to the top with the cool syrup. Then place the lids loosely on each jar and sterilize the fruit for 45 minutes. Overflow the jars with boiling syrup which should be at hand, and immediately fasten or screw down the lids.

Orange Juice.

Besides containing valuable mineral salts which are important in maintaining good health, orange juice is delicious when used for fruit drinks or for flavourings, and it will keep indefinitely if the method of preservation is carefully followed.

Extract the juice from sweet oranges. Pour it unstrained into clean sterilized bottles to within 1 inch from the top and cork very tightly. Sterilize the bottled juice for 35 minutes at a temperature of 180 deg. F. Remove the bottles from the sterilizer and stand on a damp cloth until cold.

Orange Butter.

Oranges make an excellent butter which should be found useful for sandwiches and cakes. The whole of the orange is used, thus conserving the values and flavours of the fruit.

Wash the oranges, removing stems, seeds, and all blemishes. Cut into slices or small pieces. Cover with water and cook until the peel is tender. This usually takes one and a half hours. Add the sugar, using half a pound for each pound of fruit. Cook the mixture rapidly, with constant stirring until a small sample when cooled has the desired consistency, then press the mixture through a strainer. Reboil and bottle. Seal while hot. This butter has a marmalade flavour.

Orange Peel Marmalade.

Sweet orange peels are often discarded, but after the fruit has been eaten they may be used to make a very good economical product called orange peel marmalade.

The procedure is as follows :—

2 cups finely cut peel.
2 pints water.
2 medium lemons.
2¼ lb. sugar.

Soak the peels in water overnight. Next day, add the lemon juice and simmer till cooked (about three quarters of an hour) with the lid

on the pan. Then add the sugar, and when thoroughly dissolved boil rapidly until the setting stage is reached. This will take about fifteen to twenty minutes. The lemon peel may be cut finely and cooked with the orange peel, or alternatively, the half pieces may be put in and removed when the sugar is added.

Candied Orange Peel.

Candied orange peel may be made by the following quick economical method. Wash the fruit, remove the peel and cut it into thin strips. Cover the strips with water and boil for one hour. Pour off the water and repeat this operation at least once. The peels should be boiled until tender. After the water has been poured off, put the peels to drain. Prepare a syrup, using equal parts of sugar and water and pour it over the peels. Boil very slowly for an hour then allow the peels to remain in the syrup overnight. The next day boil again until the syrup flakes or sheets from the spoon (219F). Remove the peels from the syrup and drain thoroughly. Roll in powdered sugar. Cool and allow to remain in the air until dry, for several days. Place the dry candied peel in airtight jars, where it will keep for some months.

Orange Glace.

Orange glace makes a very good sweet and can be served whole or in individual glasses. Fresh or bottled oranges may be used:—

4 oz. sponge cake.
½ pint cream.
2 oz. sugar.
2 sweet oranges.
2 passion fruit.
5 tablespoons water.
6 tablespoons sugar.

Pile up sponge cake in a small rounded heap in a dish. Whip cream with sugar and add the passion fruit pulp. Cover the sponge cake with cream and place slices of orange on the cream. Boil sugar and water until of a pale amber colour and pour over the orange slices. This sets hard. Serve from the same dish.

Certified Pullorum-free Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Number.	Owner.	Date of Certification.	Number of Birds.
1	Reformatory Prison, Castlemaine	6th March, 1942	200
2	"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26th March, 1942	927
3	Stewart, J. A., Castlemaine	22nd April, 1942	592
4	Rushton's Electric Hatcheries (J. Rushton), Shepparton	28th April, 1942	653
5	Christie, R. R., and Son, Bentleigh	1st May, 1942	719
6	Becker, F. W., Cheltenham	1st May, 1942	315
7	Kostos, D., Cr. Collins and Waverley-roads, Oakleigh, S.E. 12	11th May, 1942	801
8	Evans, R., 50 Simpson-street, Kyneton	11th May, 1942	35
9	Throup, R. E., Neerim South	11th May, 1942	200
10	Berry, R., Campbell's Creek	11th May, 1942	87
11	Flack, Mrs. Florence, Horsham	11th May, 1942	100
12	Need, H. G., Warragul	15th May, 1942	254
13	Smith, R. Harcourt	15th May, 1942	97
14	Dookie Agricultural College, Dookie	19th May, 1942	447
15	Pettigrove, D. N., Kennington, via Bendigo	19th May, 1942	558
16	Wohlers, S., Jung	21st May, 1942	139
17	Throup, N. C., Neerim South	21st May, 1942	67
18	Mair, W. P., Tyabb	21st May, 1942	38

Neutralization of Sour Cream for Buttermaking

4.—The Neutralization of Cream in Victorian Butter Factories

By F. S. J. NEWMAN, B.Agr.Sc.

PREVIOUS work done on Victorian butters by Loftus Hills, Scharp and Bellair (1) and Trembath and Newman (2) has shown that large variations in acidity occur. That this variation is not confined particularly to Victoria is shown by the work of Kretchmar (3) in Western Australia and Pont and Sutton (4) in New South Wales.

In 1935, Loftus Hills, Scharp and Bellair (*loc. cit.*) found from the results of the examination of 66 samples, that the pH values varied from 5 to 8, with 53 per cent. of the samples falling in the pH range of 5 to 6.5.

In 1938 Trembath and Newman (*loc. cit.*) from the examination of 180 samples found pH values ranging from 6 to over 8, with 78 per cent. of the samples falling within the pH range 7 to 8.

These results indicate that while the manufacturers of butter in Victoria adopted the conclusion of Loftus Hills, Scharp and Bellair, that in general the acidity of Victorian butter was too low to be consistent with good keeping quality, there does not seem to have been much improvement in the uniformity of acidity. From general considerations it might have been expected that some improvement would have been evident in the results of the second survey noted. After the publication of the results of the former workers, considerable attention was directed to this defect, and remedial measures were taken. These in the main consisted of neutralizing the cream to lower acidities, a calculated acidity at churning of 0.1 per cent. expressed as lactic acid being almost universally adopted, except in the case of some butters made for special purposes. In view of the variation found by Trembath and Newman (*loc. cit.*) in butters made from cream ostensibly standardized to very similar acidities, it was thought that a survey of the existing conditions of cream neutralization in butter factories might be of interest, especially when compared with the experimental results obtained under controlled conditions.

Accordingly 14 butter factories were selected throughout the State, the basis of selection being to include at least one typical factory from each district. It was considered that by this method a fair representation of the manner in which this process was being performed throughout the State would be obtained. Table I. shows the districts selected and the number of factories in each district.

TABLE I.

District.	No. of Factories.
Gippsland	3
Western	2
Central	1
North Central	2
Northern Country	1
Wimmera	1
Mallee	1
North East	3

On request, these factories forwarded a sample of butter to a central laboratory for pH determination. In addition to the butter sample, the following record of the details of cream processsing was included.

DETAILS OF MANUFACTURE OF EXPERIMENTAL BUTTER SAMPLE.

1. Acidity of raw cream.....
2. Acidity aimed at in neutralization.....
3. Quantity of cream in neutralizing vat.....
4. Quantity of neutralizer added.....
5. Type of neutralizer used.....
6. Acidity determined after pasteurization.....
7. Acidity determined before churning.....
8. Time and temperature of holding.....
9. Temperature of churning.....
10. Method and temperature of pasteurization.....
11. Per cent. fat in cream at neutralization.....
12. Per cent. fat in cream at churning.....
13. Name of factory.....
14. Date.....

After examination of the sample and perusal of the information forwarded, a brief report was sent to the factory concerned, with advice concerning neutralization when it was considered necessary.

Results.

In all 78 samples were received, 68 from 12 factories using some type of vacuum pasteurizer and 10 from 2 factories using flash pasteurizers. In setting out the results the factories have been divided on the basis of the type of pasteurizer used, since in flash pasteurization more carbon dioxide is usually retained in the cream with considerable effect on the titratable acidity but little on the pH. Also on this account inclusion of these samples in a general table would confuse any comparison with the experimental results since these were all obtained from butters churned from creams pasteurized in vacuo.

Table II. sets out the results of pH determinations for butters made from creams of varying acidity at churning. The mean pH values for butter made under experimental conditions from creams of a similar acidity are included for the purposes of comparison

TABLE II.—pH VALUES FOR BUTTER SAMPLES FOR ANY GIVEN TITRATABLE ACIDITY AT CHURNING

Titratable Acidity.	pH Samples.	Factory Samples.			Experimental Samples.		
		Mean pH.	Average difference from Mean.	Maximum difference from Mean.	Mean pH.	Average difference from Mean.	Maximum difference from Mean.
	A.—*Factories using Vacuum Pasteurizers.*						
·04	8·05, 7·51, 7·18	7·58	·21	·47	7·38	·09	·14
·05	7·78, 7·43, 7·09	7 43	·23	·69	7·30	·12	·31
·06	7·43, 7·35, 7·32, 7·16	7 31	·08	·15	..	..	
·07	7·36, 7·13, 7·03	7·17	·12	·19	6·99	·04	·12
·08	7·82, 7·75, 7·58, 7·37, 7·34, 7·27, 7·21, 7·11, 7·09, 7·04, 7·01, 6·91, 6·88, 6·82, 6·49	7·18	·27	·69	6·79	·18	·36
·09	7·63, 7·58, 7·36, 7·25, 7·21, 7·14, 7·13, 7·09, 7·08, 7·07, 6·93, 6·85, 6·74, 6·63	7·12	·21	·51	6·66	·14	·23
·10	7·56, 7·47, 7·36, 7·33, 7·19, 7·18, 7·17, 7·07, 7·04, 7·03, 7·03, 6·93, 6·73	7·15	·16	·41	6·51	·25	·38
·11	7·35, 7·15. 6·97, 6·89, 6·58 ..	6·99	·19	·41	6·42	·09	·15
·12	7·24, 6·73	6·89	·25	·26	..	..	..
·13	6·43, 6 38	6·40	·02	·03	..	..	..
·14	5·94	5·94	..	..	..	..	..
·15	6·05	6·05	..	..	..	..	..
	B.—*Factories using Flash Pasteurizers.*						
·05							
·06	7·01	..	..	..	..	..	..
·07	7·43	..	..	..	..	..	..
·09	7·08	..	..	..	..	..	..
·10	7·30, 6·88, 6·85	..	..	..	..	..	..
·12	7·43	..	..	..	..	..	..
·15	7·24	..	..	..	..	..	..
·16	6·99	..	..	..	..	..	..
	6·44	..	..	..	..	..	..

Table III. shows the percentage of butter samples falling in any given pH range.

TABLE III.

pH Butter.	Number of Samples.	Percentage.
Less than 6·60		
6·60–6·79	7	9
6·80–6·99	4	5
7·00–7·19	11	14
7·20–7·39	26	33
7·40–7·59	16	20
7·60–7·79	9	11
7·80–7·99	3	4
Over 8·00	1	..
.. .. ..	1	..

As can be seen the pH ranges in Table III. differ by 0.2 pH units. This may be criticized as being an unduly narrow limit, but since about 54 per cent. of the samples examined fell in the pH range 7.0 to 7.4, it was considered desirable to show within narrower limits the distribution of these samples, as many authorities consider butters with pH values above 7.2 as being too alkaline.

Table IV. sets out the pH values of butters derived from creams of varying acidity at churning. The pH values in this case being divided on the basis of the acidity prior to neutralization, the object being to determine if the initial acidity of the cream had any effect

A probable contributing cause of the wide divergence in titratable acidity, is the failure of the pasteurizer in Factory II. to expel the carbon dioxide from the neutralized cream adequately.

The results quoted for both types of factory indicate that whilst on the whole the pH of Victorian butter is satisfactory, the accuracy of neutralization in factories is not of a high order. The most probable cause of this inaccuracy appears to be errors in the determination of cream acidity.

Acknowledgments.

The author desires to express his gratitude to the managers of the factories who so generously assisted in this investigation by providing butter samples and factory records. He is also grateful to Dr. W. J. Wiley, of the Council for Scientific and Industrial Research, for his advice and criticism during the course of the work.

Summary.

In the four articles comprising this series, the neutralization of sour cream was investigated from the following aspects:—

(*a*) The Estimation of the Acidity of the Cream.

(*b*) The Titratable Acidity of Cream and Buttermilk and the pH of Butter.

(*c*) Some Factors Affecting the Accuracy of Neutralization.

(*d*) The Neutralization of Cream in Victorian Butter Factories.

(*a*) It was found that the accuracy of the titration of sour cream was seriously affected by the following factors, quantity of indicator used, method of measurement of the sample, and the presence of carbon dioxide. A method capable of giving reproducible results is outlined.

(*b*) The relationship between the titratable acidity and pH of raw cream, neutralized, pasteurized cream and buttermilk, and the pH of cream and butter was investigated. It was found that a reasonably close correlation existed between the titratable acidity and pH of raw cream, neutralized, pasteurized cream and buttermilk. However, the relationship between the pH of neutralized, pasteurized cream and the pH of the butter churned from it was not exact, and was subject to wider variations than could be explained by experimental error. The change of pH of butter in cold storage was also investigated. It was found that in the great majority of samples the change was small. A tendency for butters of high initial pH to decrease more than butters of low initial pH was noted.

(*c*) The effect of carbon dioxide and bacterial action, between the times of addition of neutralizer and commencement of pasteurization, on the accuracy of acidity reduction were investigated. It was found that with the use of sodium bicarbonate-type neutralizer and pasteurization in vacuo, that theoretical reduction in acidity was obtained to an acidity of .05 per cent. in the neutralized, pasteurized cream. When neutralizing to lower acidities than this, the linear relationship no longer applied, and acidities higher than calculated were obtained. Carbon dioxide determinations made on some neutralized, pasteurized cream indicated that about half of this excess acidity was due to retention of this gas.

The serious effect bacterial action can have on the accuracy of neutralization was demonstrated. To minimize this, it was suggested that cream be pasteurized as soon as possible after the addition of the neutralizer and held at as low a temperature as possible before pasteurization.

(*d*) Seventy-eight samples of butter from 14 Victorian butter factories were examined and pH determinations made on them. It was found that greater uniformity in acidity existed than was apparent in former surveys, and about 54 per cent. of the samples fell within a pH range which is normally considered satisfactory. It was found however, that butters made from creams of ostensibly the same titratable acidity had higher mean pH values, and showed greater variation in the pH of individual samples than experimental butters made from creams neutralized to similar acidities.

Evidence is brought forward which suggests that this divergence between the commercial and the experimental butters is due to errors made in the initial titration of the cream in the factories.

References.

1. Loftus Hills, Scharp and Bellair (1934)—*J. Dairy Res.* 5, 133.
2. Trembath and Newman (1938)—*J. Agr., Vic.*, 37, 233.
3. Kretchmar (1938)—*J. Dept. Agr.*, W.A., 15 (2nd Series), 330.
4. Pont and Sutton (1938)—*J. Inst. Agric. Sci.* 4, 9, 6.

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69
Banyule Stud Pty. Ltd.	Heidelberg ..	42
Black, I. S., Estate ..	Mount Noorat ..	52
Clarke, A. B. ..	Glenormiston South	16
Dennis, Mrs. A. A. ..	Frankston	33
Dookie Agricultural College	Dookie	77
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15
Geelong Grammar School	Corio	56
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29
Gorman, A. W. ..	"Cathcart," Alexandra	61
Holloway, R. W. ..	Caldermeade ..	70
Kilmany Park Farm Home for Boys	Sale	94
Lawrence, P. H. ..	"Rainga," Tarrawarra	72
Longerenong Agricultural College	Dooen	43
McNabb and Son, G. A.	Irrewillipe East ..	177
Onley, W. H. ..	"Glenholme," Caldermeade	50
Payne, A. E. T. ..	"Yarra View," Lilydale	63
Payne, T. E. N. ..	"Woodburn," Kilmore	46
Powell, T. S. ..	"Carellen," Mansfield	46
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Samuel, Misses G. and E.	Lang Lang ..	48
School of Horticulture	Burnley	9
State Experiment Farm	Rutherglen ..	40
State Research Farm	Werribee	229
Wells, W. G. ..	Caldermeade ..	62

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43
Andrew, J. C. ..	Whittlesea ..	121
Andrew, W. ..	Whittlesea ..	160
Andrews, E. H. ..	Templestowe ..	28
Balharrie, J. A. ..	Whittlesea North ..	59
Barclay, A. H. ..	Whittlesea ..	107
Barling, J. ..	Mernda	39
Batten, R. J. ..	Wollert	44
Bebbington, J. ..	Whittlesea ..	92
Benson, R. ..	South Morang ..	28
Booth, Mrs. A. ..	Warrandyte ..	8
Bourke, G. J. ..	Fairfield	82
Bradbury, A. K. ..	Diamond Creek ..	31
Buckley, F. J. ..	Mernda	104
Bunting, J. ..	Epping	24
Callaghan, L. ..	Epping	34
Callaghan, T. F. ..	Thomastown ..	40
Carr, W. J. ..	Wollert	38
Child, G. P. ..	Epping	53
Chiminello, A. ..	Epping	44
Christian Bros. ..	Doreen	41
Clark, P. W. ..	Whittlesea ..	62
Clements, M. and L., and Son	Bundoora	135
Cobain, J.	Thomastown ..	40
Collins, L.	Doreen	74
Cornfoot, D. H. ..	Whittlesea ..	25
Cotchin, J. ..	Woodstock ..	18
Coulthard, J. J. ..	Whittlesea ..	66
Cox, E. H. ..	Lower Templestowe	37
Craker, Mrs. E. ..	Warrandyte ..	2
Cumming, H. R. ..	South Morang ..	20
Danaher, J. V. ..	Whittlesea ..	63
Danns, N. C. ..	Whittlesea ..	34
Deutscher, H. W. ..	Mernda	168
Deveny, M. ..	Bundoora	51
Drysdale, J. C. ..	Warrandyte ..	37
Escott, G.	Epping	46
Escott, S. A. ..	Epping	63
Evans, Miss M. ..	Bundoora	29

on the pH of the resultant butter, through carbon dioxide influencing the initial titration of the cream. In this case only the factories using vacuum pasteurizers are considered.

TABLE IV.—(*a*) pH OF BUTTERS CHURNED FROM CREAM HAVING AN INITIAL ACIDITY GREATER THAN .30 PER CENT.

Titratable Acid at Churn.	pH Butter.	Mean pH.
·07	7·36, 7·03	7·18
·08	8·82, 7·75, 7·51, 7·37, 7·34, 7·27, 7·21, 7·11, 7·01, 6·82	7·32
·09	7·63, 7·58, 7·25, 7·14, 7·09, 7·08, 7·07, 6·93	7·22
·10	7·47, 7·36, 7·19, 7·07, 7·07, 7·03, 7·03, 6·73	7·12
·11	7·35, 6·97	7·16

(*b*) pH OF BUTTER CHURNED FROM CREAM HAVING AN INITIAL ACIDITY LESS THAN .30 PER CENT.

Titratable Acid at Churn.	pH Butter.	Mean pH.
·07	7·13	7·13
·08	7·09, 7·04, 6·91, 6·88, 6·49 ..	6·88
·09	7·36, 7·21, 7·13, 6·85, 6·74, 6·63	6·99
·10	7·56, 7·33, 7·18, 7·17, 7·04, 7·03, 6·93	7·18
·11	7·15, 6·89, 6·58	6·87

Information supplied by the factories showed that in all cases neutralizers of the sodium bicarbonate or sesqui carbonate type were used.

Discussion of Results.

Compared with previous results obtained for Victorian butters in 1938 by Trembath and Newman (*loc. cit.*), a greater uniformity in acidity is apparent. Whereas in 1938 only 32.2 per cent of the butters examined fell in the pH range 7 to 7.4 and 46.1 per cent. had pH values between 7.5 and 8 and over, in the present case 53 per cent. fell within the former range and 18 per cent. in the latter. Although a greater uniformity in acidity is obvious in the present case it should be borne in mind the butters from which the samples were drawn were manufactured with the knowledge that an acidity check would subsequently be done, so it is probable that more care than is normal would be taken in standardizing the acidity.

The samples in the earlier survey mentioned were drawn at random from various grade floors so that if this possibility does exist it would not apply to them.

However the results in Table III. show that in the great majority of cases the pH of the butter falls within a range considered desirable by most authorities, that is pH 6.7 to 7.2. Very few of the butters examined fell outside the lower limit of this range, while a considerable number exceeded the upper limit. Many authorities regard butters with pH values of this order to be prone to "soda flavour." In this regard one can only refer to the results obtained during the course of the experimental work done on neutralization. Soda flavours were not found in any of the butters of high pH.

In a previous paper it was pointed out that the pH of butter made from neutralized cream does not always bear a close relationship to the titratable acidity of the cream prior to churning. It was also shown that when the mean pH value of a series of samples rather than that of a single sample was considered that a reasonably close relationship between these two factors was found. It seems reasonable to assume, that for factories using vacuum pasteurizers, provided the churning acidity of the cream was accurately determined the mean pH values of butters made under commercial conditions, and derived from creams of any given titratable acidity at churning, should approximate to the mean pH for butters made from creams of the same acidity under experimental conditions.

Reference to Table II., however, shows that a considerable discrepancy exists between the mean pH values of the factory and experimental butters. In every case the mean pH of the factory-made butters is considerably higher. There is also a marked similarity in the mean pH of butters made from creams of widely differing acidities.

Butters made from creams of acidities of 0.07 to 0.11 per cent. had mean pH values which are practically identical. The most probable explanation appears to be that the factory determinations of acidity are incorrect. Examination of the evidence supports this supposition.

The errors made in acidity determination of the cream at churning, and also probably before neutralizing, seem to fall into two distinct classes, (*a*) variable errors due to faulty technique, and (*b*) constant errors, probably due

to the inability of the factory operative to recognize the end point of the titration, with a result that the sample is titrated to a deeper colour. The difference in end points represents the addition of a constant amount of alkali for each titration.

As an illustration of these two types of error the results obtained from four factories are interesting enough to be quoted in detail. Factories A and B illustrates the variable error, and C and D the constant error.

Factory A.

Cream Acidity at Churning.	pH of Butter.
·04	8·05
·04	7·51
·04	7·18
·05	7·78
·05	7·43
·05	7·09

Factory B.

·07	7·36
·08	7·82
·08	6·49
·09	7·63
·09	6·63

Factory C.

Cream Acidity at Churning.	pH of Butter.
·10	7·56
·10	7·47
·10	7·36
·10	7·19
·11	7·35

Factory D.

·10	7·33
·10	7·18
·10	7·17
·10	7·04
·10	7·03
·10	6·93

Another interesting feature arising from the analysis of the information forwarded by the factories was that the churning acidity aimed at in neutralizing was, with the exception of a few cases, always attained, the greatest error being 0.02 per cent. acidity.

In view of the great individual variation in butter pH shown in Table II., greater errors than this might have been expected. It seems probable that, in many cases the titration of the cream at churning time was a measure of the acidity the factory operative considered ought to be present, rather than the true acidity of the cream. In an endeavour to confirm this supposition the amounts of neutralizer added to the sour cream were checked, since it was thought that errors in acidity may have been caused by miscalculations of the weight of neutralizer necessary. It was found that in the case of the factories using vacuum-type pasteurizers that in 18.9 per cent. of the samples less neutralizer than the theoretical amount was added. In every case the amount of neutralizer lacking only accounted for a variation of 0.02 per cent. acidity in the cream. It seems probable from the regularity of the figure that this was an arbitrary allowance made to cover the loss of carbon dioxide during pasteurization.

As pointed out in a previous paper, with creams of high initial acidity considerable errors can arise if the sample is not boiled prior to titration. As this practice is followed in very few Victorian factories, the pH values of the butter samples were divided into two classes, on the basis of the initial acidity of the cream. The results of this division are set out in Table IV., the individual pH values being again grouped under the acidity of the cream at churning. The mean pH values show that the type of cream does seem to have some effect on the acidity of the butter, when the initial titration is done without boiling the sample. However, large individual variations still exist which cannot be attributed to this cause.

Two other factors could also account for these variations—(*a*) inaccurate measurement of the amount of cream to be neutralized, and (*b*) inaccurate measurement of the neutralizer used. As previously stated these butters were made with the knowledge that an acidity check would be done, so that it is improbable that mistakes in these simple operations would be a serious source of error. Even if errors did exist, due to these factors, they should have been apparent in the churning acidities, and this is not the case. This again points to the acidity determination as being the major factor in the constant and variable errors observed.

The results obtained from factories using flash pasteurizers, although meagre, show that a reasonable pH can be attained in the butter using this type of machine. A point of interest arising from them is the similar pH values obtained by the two different factories for widely dissimilar titratable acidities. The individual results are quoted below:—

Factory I.

Titratable Acidity at Churning.	pH of Butter.
·05	7·01
·06	7·43
·07	7·08
·09	7·30
·09	6·88
·09	6·85

Factory II.

Titratable Acidity at Churning.	pH of Butter.
·01	7·43
·12	7·24
·15	6·99
·16	6·44

TUBERCLE-FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name	Address.	Number in Herd at Last Test.
Fellows Bros.	West Heidelberg	52	Nalder, H. S.	Epping	20
Fergusson, M. A.	Whittlesea	92	Nebel, Mrs. A. E.	Thomastown	38
Fitzsimons, B.	Lower Templestowe	30	Norton, O. G.	Bundoora	37
Fox, A.	Mernda	59	O'Hern, T.	Epping	58
French, T. W.	Wollert	43	O'Loughlin, W. L.	Epping	30
Gallus, E. A.	Doncaster	11	Parker, Mrs. A. E.	Greensborough	24
Gardiner, C. E.	Epping	20	Pentland, C. V.	Templestowe	17
Gibbs, C.	Arthur's Creek	28	Pettit, W. H.	Thomastown	36
Graff, Mrs. M. G.	Mernda	24	Pitson, R H.	Yarrambat	17
Graham Bros.	Whittlesea	71	Player, A. D.	Epping	42
Green, W.	Mernda	11	Power, L. J.	Mernda	52
Hall, J. E., Mrs.	Whittlesea North	13	Quinlan Bros.	Epping	49
Hancorne, Miss M. R.	Yan Yean	27	Raper, L. R.	Greensborough	36
Harding, J. E.	Templestowe	42	Rawlings, J. H.	Whittlesea North	41
Hardwick, A. E.	Epping	35	Righetti, L. A.	Lower Templestowe	40
Hargreave, Mrs. E. J.	Whittlesea	21	Robson, Mrs. G. A.	South Morang	47
Harkness, H. J.	South Morang	31	Rodgers, E.	Whittlesea North	11
Harmer, R. E.	Wollert	38	Rosewarne, Miss P.	Yan Yean	43
Hawkes, Miss D.	Warrandyte	19	Ross, A.	Templestowe	5
Hehr, H.	Epping	31	Salcki, S.	Thomastown	51
Hehr, R.	Wollert	23	Seeber, B.	Thomastown	24
Herd, J.	Wollert	41	Shanks, B.	Mernda	73
Hewitt, C. J.	Wattle Glen	9	Sheeky, A. A.	Templestowe	14
Higgs, R. N.	Yan Yean	76	Short, E.	East Preston	99
Hobbs, Mrs. F. J.	Doncaster East	6	Siebel, F.	Thomastown	26
Hobbs Bros.	Heidelberg	65	Skals, P.	Rosanna	28
Howden, A.	Epping	29	Smirfitt, J. E.	Epping	39
Howell, G. G.	Wollert	221	Smith, G. A.	Templestowe	63
Hughes, J.	South Morang	1	Smith, J. R.	Mernda	34
Jackson, Mrs. M. A.	Heidelberg	7	Smith, L. McA.	Yan Yean	2
Jenkins, T. H.	Whittlesea	14	Smith, L. W.	Bundoora	73
Johnstone, J. A., Miss	Mernda	14	Smith, P. A.	Ivanhoe	2
Jones, A. J.	South Morang	30	Smith, R. A.	Epping	27
Jukes, C.	Epping	34	Smith, R. J.	Epping	54
Jukes, W. H.	South Morang	35	Smith, S. E.	Epping	31
Junor, G. M.	South Morang	37	Southon, H. W.	South Morang	27
Kell, W. E.	Greensborough	21	Stephens, H.	Epping	48
Lay, P.	Alphington	30	Stimson, T.	Woodstock	29
Loft, A. H.	Wollert	52	Tarry, J.	South Morang	24
McCormack, D.	Woodstock	33	Thomas, W. C.	Yan Yean	31
McDonald, A. J.	Whittlesea	2	Towt, C. W.	Glenvale	136
McDonald, J.	Templestowe	20	Vallence, C. A.	Epping	11
McDowell, R. H.	Greensborough	28	Van, E. L.	Templestowe	28
McGregor, W. B.	Mernda	41	Walsh, J. B.	Templestowe	11
McKendry, J.	Doreen	47	Whelpton, B.	Whittlesea North	59
McKernan, A. H.	Whittlesea	24	White, W.	Greensborough	18
McKie, J. W.	Wollert	83	Whittingham, E. W.	Greensborough	40
McLean, J. F.	Bundoora	32	Williams, E. A.	Thomastown	33
McPhee, K.	Whittlesea	116	Williamson, J.	Doncaster (High-street)	5
McPherson, A.	Yan Yean	64	Wilson, J. E.	Diamond Creek	35
Mann, W. J. and K. W.	Thomastown	108	Wilson, Mrs. M.	South Morang	14
May, Mrs. M.	Warrandyte	5	Wood, A. V.	Yan Yean	125
Mays, Mrs. A. M.	Doncaster	5	Wrest, W.	Epping	76
Merriman, J.	Diamond Creek	17	Wuchatsch, A.	Epping	29
Miller, A. J.	Whittlesea North	47	Wuchatsch, J. D.	Epping	14
Miller Bros.	Greensborough	36	Yann, R.	Wollert	52
Mosig, H. C.	Epping	24	Young, Mrs. A.	Wollert	33

There are also 81 herds in which 3,783 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Standard Herd Records

For Quarter ended 31st March, 1942

In the following are set out the records of all cows which completed a lactation during the quarter. The number is 379, of which 278 qualified for the certificate. The figure in brackets after the owner's name shows the number of entries.

The amount of butter-fat required for qualification varies with the age class to which the animal belongs, the standard being as follows:—

Junior 2-year old (under 2½ years at time of calving)	230 lb. butter-fat.
Senior 2-year old (between 2½ and 3 years at time of calving)	250 lb. butter-fat.
Junior 3-year old (between 3 and 3½ years at time of calving)	270 lb. butter-fat.
Senior 3-year old (between 3½ and 4 years at time of calving)	290 lb. butter-fat.
Junior 4-year old (between 4 and 4½ years at time of calving)	310 lb. butter-fat.
Senior 4-year old (between 4½ and 5 years at time of calving)	330 lb. butter-fat.
Mature cow 5 years and over	350 lb. butter-fat.

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Alston, Mrs. N. B., and Sons, Romsey, Jersey (4).										
Rosyth Gay Rosebud ..	64112	273	12½	6,091	5·45	332·1	350	Mature	237, 340, 345	Werribee Gaypiece
Rosyth Golden Daffodil ..	78774	273	9	5,157	5·82	299·9	290	Sr. 3	253 ..	Werribee Gaypiece
Rosyth Rose Petal 2nd ..	78776	273	13	4,464	5·80	258·7	230	Jr. 2	.. ..	Glen Iris Matilda's Beau
Rosyth Sweetbread ..	50506	273	12	5,766	5·71	329·5	350	Mature	235, 264, 291, 300, 509, 354	Aveley Antony
Anderson, I., Warburton, Jersey (1).										
Banyule Silvermine 121st	65344	273	N.C.K.	6,681	4·53	302·9	270	Jr. 3	288 ..	Banyule Monoplane
Andrew, W., Whittlesea, Ayrshire (1).										
Glenayr Geum	32396	273	N.C.K.	8,678	4·33	375·6	290	Sr. 3	358 ..	Gladfield Victor
Atkinson, W. K., Swan Hill, Dairy Shorthorn (8).										
Willow Park Camelia 29th	Vol. 2	273	19	8,504	3·60	305·8	270	Jr. 3	216 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Comet 7th ..	1231E	273	33	12,256	3·86	473·1	350	Mature	284, 378, 446, 497, 425, 467, 462, 485	Willow Park Design
Willow Park Countess 9th	1244E	273	32½	11,811	4·14	488·6	350	Mature	396, 489, 443, 476, 463, 456, 451	Willow Park Imperial 3rd
Willow Park Duchess 44th	Vol. 2	273	18½	8,850	3·91	345·8	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Melba 15th ..	1315E	273	33	11,844	4·46	528·7	350	Mature	414, 426, 446, 460, 484	Willow Park Lustre 3rd
Willow Park Moss Rose 14th	Vol. 2	273	29	11,433	3·32	379·2	310	Jr. 4	283, 366 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Moss Rose 15th	Vol. 2	273	8	10,211	3·20	326·3	290	Sr. 3	293 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Moss Rose 21st	Vol. 2	273	30	9,501	3·64	345·9	230	Jr. 2	.. ..	Willow Park Imperial Cran 3rd
Austin, F., Lara, Jersey (6).										
Avalon Madeira's Pansy 15th	74939	273	N.O.C.	4,304	5·55	238·9	230	Jr. 2	.. ..	Mornmoot Prince Madeira
Avalon Madeira's Pansy 16th	74940	240 (Herd withdrawn)	..	6,060	4·80	291·0	230	Jr. 2	.. ..	Mornmoot Prince Madeira
Avalon Starbright's Pansy 7th	65238	180 (Herd withdrawn)	..	7,530	5·04	379·3	290	Sr. 3	415, 445 ..	Avalon Starbright 8th
Avalon Starbright's Pansy 8th	70068	210 (Herd withdrawn)	..	6,705	5·77	386·8	250	Sr. 2	348 ..	Avalon Starbright 8th
Avalon Starbright's Pansy 10th	74942	180 (Herd withdrawn)	..	3,495	6·88	240·4	230	Jr. 2	.. ..	Avalon Starbright 8th
Avalon Starbright's Queen 3rd	70070	273	N.O.C.	6,062	6·78	410·9	250	Sr. 2	358 ..	Avalon Starbright 8th

STANDARD HERD RECORDS—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Ballarat Orphanage, Ballarat, Jersey (3).										
Blackwood Grove Miss Leach	37935	273	24	7,679	5·39	414·0	350	Mature	405, 388, 369, 467	Burnside Harmony
Orphanage Melba 11th ..	63536	273	23	8,090	5·31	429·3	330	Sr. 4	313, 450, 536	Murona Twylair
Orphanage V.C.'s Molly 2nd	41413	273	25½	8,027	4·82	386·9	350	Mature	324, 494, 385, 460	Wompini V.C.
Banyule Pty. Ltd. (C. G. Lyon), Wangaratta, Jersey (3).										
Banyule Hawthorn 21st ..	56253	273	37½	11,321	5·36	606·3	310	Jr. 4	449, 439 ..	Banyule Oxford Don
Banyule Silvermine 134th	70194	273	21½	7,570	6·22	470·7	230	Jr. 2	.. ..	Banyule Upcast
Banyule Ettie 21st ..	70185	273	22	6,331	5·80	366·9	230	Jr. 2	.. ..	Banyule Double Purple
Bennett, J. W., Yinnar, Jersey (5).										
Ellendale Bluebell 10th ..	57144	273	N.C.K.	10,082	4·83	486·5	350	Mature	523 ..	Ellendale Viking
Ellendale Cloudy ..	57145	273	N.C.K.	8,321	6·18	514·4	350	Mature	.. ..	Mistletoe 2nd's Treasure of Lynulg
Ellendale Kirsty 29th ..	76084	273	N.C.K.	9,272	5·27	488·6	330	Sr. 4	.. ..	Staghorn Bellboy
Glen Valley Verbena's Buttercup	40008	273	N.C.K.	6,879	5·83	401·0	350	Mature	407, 420, 439	Glen Valley Buttermakers Boy
Jerseyinn Vanilla 3rd ..	23488	273	N.C.K.	6,161	5·10	314·1	350	Mature	454, 466, 420	Venture's Hero
Bennett, R. H., Lancefield, Jersey (4).										
Edenhope Iris	76034	240	4	5,655	5·79	327·5	250	Sr. 2	324 ..	Jindivick Defiance
Edenhope Fancy's Twylish	66301	273	17½	7,067	4·90	346·6	330	Sr. 4	333 ..	Edenhope Canary's Count
Edenhope Tulip	61372	273	17	8,229	5·22	429·7	330	Sr. 4	333, 359 ..	Edenhope Canary's Count
Rosyth Romany Rose ..	59337	273	12	5,669	6·02	341·2	350	Mature	342, 440 ..	Werribee Gaypiece
Black, Estate of late I. S., Noorat, Ayrshire (4).										
Mount Noorat Alert 11th ..	33887	273	13	5,271	5·47	288·1	230	Jr. 2	.. ..	Gowrie Park Scottish Patron
Mount Noorat Boronia 6th	33889	273	16	6,938	4·10	284·8	230	Jr. 2	.. ..	Gowrie Park Bonnie Standard
Mount Noorat Janice 6th	33890	273	17½	7,212	4·51	325·1	230	Jr. 2	.. ..	Gowrie Park Bonnie Standard
Mount Noorat Janice 7th	33891	273	8	4,799	4·16	199·6	230	Jr. 2	.. ..	Gowrie Park Bonnie Standard
Broad, Mrs. A. A., Sutton Grange, Jersey (1).										
Grangelea Rona 2nd ..	C.R.	273	10	4,457	6·72	299·5	250	Sr. 2	.. ..	Grangelea Roderick 2nd
Broad, A. J., Pyramid, Jersey (1).										
Grangelea Rose Petal ..	48526	273	16	6,932	6·85	336·2	350	Mature	436 ..	Clarendon Eyre Eminent's Ruddigore 3rd
Butcher, F. T. Murrzydale, Red Poll (1).										
Maryville Ethel	8004B	273	N.C.K.	5,160	4·21	217·2	230	Jr. 2	.. ..	Temperley Prism
Cannard, Mrs. M. I., Mulgrave, Jersey (1).										
Arranmore Design's Lady	70018	251	..	5,169	4·80	248·3	310	Jr. 4	.. ..	Glen Iris Design's Dreamer
Carne, W., Pakenham Upper, Jersey (1).										
Wonga Park Lady Jess ..	69761	273	30	10,035	5·61	562·5	310	Jr. 4	445 ..	Womga Park Minx's Ace
Chadderton, J. E., Hamilton, Jersey (4).										
Glen Leigh Damsel ..	52821	273	11½	7,116	5·40	384·4	350	Mature	299, 354, 337, 382	Glen Leigh Bounty
Glen Leigh Daphne 2nd ..	61705	273	16	7,923	5·77	457·5	330	Sr. 4	370, 356 ..	Selsey Jupiter
Glen Leigh Dawn 3rd ..	57357	273	13	6,512	6·52	424·5	330	Sr. 4	342, 344 ..	Selsey Jupiter
Glen Leigh Diamond ..	66575	273	16	6,888	4·45	306·6	270	Jr. 3	279 ..	Glen Leigh Volunteer
Chirnside, R. M., Whittlesea, Jersey (1).										
Werribee Clemency ..	74495	273	19½	6,708	5·50	368·9	230	Jr. 2	.. ..	Staghorn Master Clement
Clark, P. W., Whittlesea, Jersey (1).										
Toorango Princess Mona ..	50904	273	19	7,113	5·12	364·0	350	Mature	319, 363, 444, 410	Kantara Don Juan
Clark, W. J., Monomeith, Jersey (3).										
Glenavon Starbright 5th ..	Vol. 29	210 (Herd withdrawn)	..	5,115	5·26	269·3	230	Jr. 2	.. ..	Glenavon Maystar
Glenavon Velvet ..	Vol. 29	210 (Herd withdrawn)	..	4,680	6·08	284·7	230	Jr. 2	.. ..	Glenavon Starbright's Airshaft
Rockdale Gama 6th ..	63910	240 (Herd withdrawn)	..	7,440	5·36	398·6	350	Mature	.. ..	Rockdale Golden

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Colenso, L. W. R., Alvie, Jersey (16).										
Normandie Alsyke 3rd ..	68358	273	21	8,001	4·99	399·6	310	Jr. 2	253, 354 ..	Lewisham Playboy
Normandie Alsyke 4th ..	73201	273	23	7,889	4·95	390·6	270	Jr. 3	262 ..	Lewisham Playboy
Normandie Buttercup 2nd	33188	273	21	8,912	5·67	505·3	350	Mature	317, 486, 412, 447, 475, 375, 337, 330, 441, 409	Peer of Lewisham
Normandie Golden Nancy 3rd	68359	273	24½	9,239	6·03	557·4	310	Jr. 4	383, 405 ..	Normandie Majestic
Normandie Golden Nancy 4th	78132	273	14½	5,042	6·25	315·1	230	Jr. 2	.. ..	Normandie Majestic
Normandie Golden Nancy 5th	78133	273	12½	6,776	5·14	348·0	230	Jr. 2	.. ..	Lewisham Playboy
Normandie Hawthorn 12th	63438	273	27½	9,675	5·51	533·1	350	Mature	180, 401, 347	Normandie Mayflower's Fancy Masterpiece
Normandie Hawthorn 15th	68361	273	35½	11,462	4·86	557·1	290	Sr. 3	303, 360 ..	Lewisham Playboy
Normandie Ilma 4th ..	58745	273	25½	9,942	4·90	486·9	350	Mature	247, 302, 406	Normandie Majestic
Normandie Ilma 6th ..	68362	273	24	7,664	6·16	472·2	310	Jr. 4	358, 435 ..	NormandieMajestic
Normandie Ilma 7th ..	68363	273	12½	4,399	5·32	234·1	290	Sr. 3	235, 239 ..	Normandie Majestic
Normandie Ilma 10th ..	73203	273	18	6,933	4·67	323·7	250	Sr. 2	206 ..	Lewisham Playboy
Normandie Ilma 11th ..	78136	273	19	7,017	4·82	338·1	230	Jr. 2	.. ..	Lewisham Playboy
Normandie Ilma 12th ..	78137	273	19½	6,207	4·56	283·0	230	Jr. 2	.. ..	Lewisham Playboy
Normandie Mayflower 11th	68365	273	16	6,468	5·59	361·8	310	Jr. 4	240, 226 ..	Normandie Majestic
Normandie Mayflower 14th	78139	273	12	4,988	4·94	246·5	230	Jr. 2	.. ..	Lewisham Playboy
Coulthard, J. J., Whittlesea, Jersey (1).										
Elmwood Merry Lark ..	57189	273	N.C.K.	6,527	5·36	350·0	350	Mature	363, 416, 335, 405, 386	Austral Valley Lord Larkspur
Cowan, G. L. S., Bacchus Marsh, Friesian (4).										
Ingolston Bangle ..	5665	273	28	9,612	3·70	355·2	350	Mature	306 ..	Ingolston Sylvester
Ingolston Kittora ..	5677	273	21	11,209	3·72	416·7	350	Mature	.. ..	Ingolston Sylvester
Ingolston Melba	5684	273	33	11,902	3·44	410·0	350	Mature	.. ..	Cordyline Cremona Pontiac
Upper Lappan Mayfield ..	Vol. 15	273	28	8,491	3·29	279·5	230	Jr. 2	.. ..	Upper Lappan Pontiac
De La Rue, N. C., Weering, Jersey (1).										
Victoria Winsome ..	37218	273	24	8,574	5·71	489·7	350	Mature	377, 479, 435, 352, 511, 444	Victoria Master Mariner
Devon Park Stud Farm (G. S. Daley), Lilydale, Jersey (2).										
Karrara Great Tecoma ..	77079	273	15	4,725	6·41	302·8	230	Jr. 2	.. ..	Brampton Great Boy (Imp.)
Noorat Harmony ..	36911	273	21	9,410	5·62	528·7	350	Mature	496, 458	Cellist of Warenda
Dennis, Mrs. A. A., Frankston, Jersey (3).										
Ballam Golden May ..	70128	273	21	6,207	4·86	301·6	230	Jr. 2	.. ..	Somerville Preference
Ballam Louise	65287	273	21	7,622	5·22	397·7	250	Sr. 2	357 ..	The Wattles Gamboge Prince
Ballam Laura	65285	273	13	6,054	5·75	348·3	270	Jr. 3	291 ..	Somerville Preference
Department of Agriculture, Werribee, Friesian (8).										
Victoria Cora	Vol. 15	273	30	9,005	3·40	336·7	230	Jr. 2	.. ..	Anama Netherland Neptune
Victoria Dimino Josie ..	6080	273	24	11,703	3·69	431·5	330	Sr. 4	330, 335 ..	Rupertswood Inka Jo
Victoria Double Piebe ..	6082	273	30	13,034	3·25	423·2	350	Mature	369, 493, 492, 485	Victoria Double Top
Victoria Geisha	6084	273	27½	10,937	3·86	422·6	270	Jr. 3	334 ..	Victoria Mikado
Victoria Inka Domino ..	6089	248 (Sold)	N.O.C.	8,373	4·11	344·2	310	Jr. 4	324 ..	Rupertswood Inka Jo
Victoria Oxeye	6094	273	6½	11,336	3·52	398·6	350	Mature	335, 341, 390	Victoria Double Top
Victoria Woodrest Daisy ..	5112	273	42	16,026	3·53	565·6	350	Mature	307, 389, 425, 416, 536, 351	Victoria Joyous Mercedes
Victoria Woodcrest Josie ..	6103	273	16	11,105	3·63	402·6	310	Jr. 4	313 ..	Victoria Inka Jo
Department of Agriculture, Werribee, Red Poll (18).										
Victoria Bead	6708AA	273	N.O.C.	8,705	4·57	397·6	350	Mature	360 ..	Woodburn Peter Pan
Victoria Belle Rose ..	3511AA	273	4	8,142	4·27	347·9	350	Mature	253, 340, 327, 433, 342	Victoria Major Royal
Victoria Bodikin ..	7010A	273	25	10,530	4·42	464·9	350	Mature	277, 357 ..	Victoria Goblin
Victoria Clinker	Vol. 11	273	15	6,705	4·35	291·7	290	Sr. 3	274 ..	Victoria Donald
Victoria Glint	7012A	273	27	9,278	4·10	380·0	290	Sr. 3	278 ..	Victoria Donald
Victoria Gratification ..	3022A	273	N.O.C.	12,069	4·12	497·3	350	Mature	330 ..	Victoria Satisfaction
Victoria Greetings ..	Vol. 11	273	6	8,009	4·21	337·5	250	Sr. 2	322 ..	Chandpara Valentine
Victoria Jane	Vol. 11	273	19	7,268	4·62	335·9	290	Sr. 3	.. ..	Woodburn Peter Pan
Victoria Kinctice ..	4889A	273	21½	12,078	4·35	525·1	350	Mature	277, 405, 440, 505	Victoria Gallant
Victoria Maiden	Vol. 11	273	17½	7,166	4·54	325·1	250	Sr. 2	.. ..	Chandpara Valentine
Victoria Mary Rose ..	6711AA	273	N.O.C.	10,679	4·28	457·1	330	Sr. 4	319, 436 ..	Chandpara Valentine
Victoria Mountain ..	Vol. 11	273	24	8,377	4·38	366·5	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Possum	Vol. 11	30	..	1,005	5·87	59·0	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Red Cape ..	Vol. 11	273	12½	5,477	4·67	256·0	230	Jr. 2	.. ..	Victoria Robin Hood
Victoria Red Tape ..	7022A	273	18	8,679	4·69	406·8	350	Mature	256, 293, 359	Woodburn Peter Pan
Victoria Reliance ..	Vol. 11	273	26	8,481	4·76	403·3	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Snowdrop B ..	Vol. 11	273	15	5,402	4·24	229·0	250	Sr. 2	276 ..	Chandpara Valentine
Victoria Wendy	6034A	273	17	10,958	4·47	490·1	350	Mature	369, 316, 357	Woodburn Peter Pan

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Dookie Agricultural College, Dookie, Ayrshire (4).										
Dookie Bebe	32243	273	15½	8,648	4·77	412·1	310	Jr. 4	325 ..	Tregorland Indispensible
Dookie Dewdrop ..	31329	273	16	7,748	4·26	330·2	350	Mature	294 ..	Tregorland Indispensible
Dookie Shirley's Lass ..	32244	273	19	8,634	4·17	360·3	330	Sr. 4	263 ..	Tregorland Indispensible
Dookie Sweetness ..	32245	273	20	8,072	4·24	342·4	330	Sr. 4	284 ..	Dookie Shirley's Boy
Dunmore, T. J., Melton, Jersey (2).										
Elderslie Lady Astor 3rd ..	76054	273	13½	5,220	5·03	262·5	230	Jr. 2	.. ..	Banyule Stope
Laura Dell Petal ..	72362	273	7	6,342	4·41	279·4	290	Sr. 3	.. ..	Brampton Pioneer Chut (Imp.)
Enders, N. H., Stanhope, Jersey (1).										
The Wattles Joy 13th ..	79196	273	32	6,662	5·52	367·9	230	Jr. 2	.. ..	The Wattles Silver Gamboge
Everist, F. R., Tyabb, Red Poll (1).										
Naranghi Nickname ..	Vol. 11	273	15½	6,762	3·99	269·8	290	Sr. 3	.. ..	Bundura Winter
Fadersen, J. H., Mandurang, Jersey (1).										
Banyule Silvermine 89th ..	42891	273	14	5,472	4·60	251·9	350	Mature	305, 336, 332, 410, 376	Oxfords Beau's Pretty Oxford (Imp.)
Fairchild and Clutterbuck, Tinambra, Jersey (2).										
Carellen Lady Charm ...	65875	273	N.C.K.	7,618	5·78	440·4	290	Sr. 3	413 ..	Darnum Park Lord Starbright
Vaucluse Empress 8th ..	79406	273	N.C.K.	5,468	5·22	285·7	230	Jr. 2	.. ..	Vaucluse Masterpiece
Fixter, A., Boisdale, Guernsey (3).										
Avonview Doreen ..	6727	273	18	6,525	5·86	382·1	270	Jr. 3	301 ..	Kentdale Monogram
Avonview Dulcie ..	2557	273	27	8,628	5·47	471·6	350	Mature	294, 317, 344, 348, 457, 428, 431, 481	Melbourne Sandboy 6th
Avonview Jean	6729	273	20	6,630	5·77	382·4	310	Jr. 4	351, 417	Kentdale Monogram
Foster, A. O., Boisdale, Jersey (5).										
Boisdale Goldfinch 2nd ..	56433	273	N.C.K.	3,510	5·56	195·2	350	Mature	168, 235, 293, 212	Wompini Master Grey
Boisdale Goldfinch 4th ..	C.R.	273	N.C.K.	3,605	5·64	203·2	230	Jr. 2	.. ..	Boisdale Masterpiece
Boisdale Nymph 2nd .	C.R.	273	N.C.K.	4,069	6·74	274·2	290	Sr. 3	292 ..	Boisdale Masterpiece
Boisdale Twilight 2nd ..	56436	273	N.C.K.	4,365	5·36	233·9	350	Mature	256, 335 ..	Boisdale Master Grey
Boisdale Twinkle 4th ..	C.R.	273	N.C.K.	3,609	6·09	219·8	230	Jr. 2	.. ..	Boisdale Masterpiece
Gay, R. G., and Son, Yarram, Jersey (3).										
Elm Grove Dairymaid 2nd	43735	273	23	8,066	5·35	431·8	350	Mature	275, 346, 362, 410, 380	Warenda Ragtime Dominant
Elm Grove Laurette 2nd ..	61465	273	15	8,888	4·75	422·5	350	Mature	310, 501 ..	Elm Grove Graceful's Masterpiece
Myrtle Point Songstress ..	45341	273	32	11,033	4·77	526·3	350	Mature	458, 498, 540, 604, 507, 534	Werribee Master King
Goddard, J. H., Cora Lynn, Ayrshire (1).										
Crescent Farm Beryl 3rd ..	32136	273	N.C.K.	10,038	4·61	463·1	350	Mature	258, 338, 458	Crescent Farm Gordon
Halsted, W. H., Ballarat, Dairy Shorthorn (2).										
Braelands Countess 5th ..	Vol. 2	273	N.C.K.	3,428	3·92	134·4	290	Sr. 3	.. ..	Braelands Centenary Earl 2nd
The Plateau Pearl Beauty 6th	Vol. 2	273	N.C.K.	2,700	4·59	123·8	230	Jr. 2	.. ..	Morven Connaught Duke
Handbury, J. E., and Son, Toora, Jersey (1).										
Tooravale Princess 35th ..	79277	273	13	6,011	6·04	362·8	250	Sr. 2	287 ..	Pinewood's Aristocrat
Hardie, R., Lardner, Jersey (1).										
Maxmount Golden Buttermaid	C.R.	273	17½	6,488	5·23	339·3	230	Jr. 2	.. ..	Maxmount Danny Boy
Harvey, T., Boisdale, Jersey (4).										
Jerseyholm Bluebell 36th ..	62307	273	N.C.K.	5,137	4·70	241·3	310	Jr. 4	227, 323 ..	Banyule Biplane
Jerseyholm Bluebell 44th ..	67191	273	5	4,172	5·10	212·7	270	Jr. 3	245 ..	Orphanage Molly's Commander
Jerseyholm Empress 67th ..	71971	273	N.C.K.	4,890	5·96	291·2	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Empress 68th ..	71972	273	N.C.K.	4,590	4·71	216·4	230	Jr. 2	.. ..	Orphanage Molly's Commander
Haywood, Dr. A. R., Hastings, Jersey (3).										
Windrest Chevy's Beauty ..	74576	273	N.C.K.	8,973	5·74	515·1	290	Sr. 3	377 ..	Gadget (Imp.)
Windrest Chevy's Cherub ..	64936	273	N.C.K.	11,315	5·32	601·7	350	Mature	386, 355, 423	Glen Iris Matador
Windrest Gay Marie ..	69732	273	N.C.K.	11,018	5·36	590·8	330	Sr. 4	291, 307 ..	Gadget (Imp.)

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Heard, H. R., Derrinallum, Ayrshire (20).										
Craigmore Adele	33401	273	N.C.K.	4,509	4·58	206·3	230	Jr. 2	.. ..	Grandview Begonia's Hot Stuff
Craigmore Adeline ..	29281	273	N.C.K.	7,266	3·95	287·2	350	Mature	.. ..	Roseleigh Reality
Craigmore Agnes ..	32119	273	N.C.K.	6,414	3·89	249·4	270	Jr. 3	.. ..	Strathkellar Buster
Craigmore Angela ..	33042	273	N.C.K.	4,896	4·00	195·9	230	Jr. 2	.. ..	Strathkellar Buster
Craigmore Angeline ..	31237	273	N.C.K.	6,506	3·85	250·6	290	Sr. 3	.. ..	Grandview Begonia's Hot Stuff
Craigmore Annie Laurie ..	24759	273	N.C.K.	7,778	3·73	290·0	350	Mature	.. ..	Roseleigh Senator
Craigmore Beam ..	33404	273	N.C.K.	6,510	4·18	272·0	230	Jr. 2	.. ..	Strathkellar Buster
Craigmore Bina	29282	273	N.C.K.	8,190	4·25	347·7	350	Mature	.. ..	Roseleigh Reality
Craigmore Brenda ..	31239	210 (Sold)	..	5,430	4·12	223·5	290	Sr. 3	.. ..	Grandview Begonia's Hot Stuff
Craigmore Edith ..	32121	273	N.C.K.	5,210	3·95	205·7	250	Sr. 2	.. ..	Strathkellar Buster
Craigmore Enid	33406	273	N.C.K.	5,136	3·78	194·2	230	Jr. 2	.. ..	Strathkellar Buster
Craigmore Esme	27056	273	N.C.K.	7,620	3·80	289·8	350	Mature	.. ..	Roseleigh Senator
Craigmore Ethel	30337	210 (Sold)	..	5,145	4·39	225·9	330	Sr. 4	.. ..	Craigmore Saxon
Craigmore June	33410	273	N.C.K.	5,426	3·82	207·3	230	Jr. 2	.. ..	Strathkellar Buster
Craigmore Lena	29285	273	N.C.K.	7,607	3·63	276·4	350	Mature	.. ..	Roseleigh Reality
Craigmore Lola	24760	273	N.C.K.	8,246	3·80	313·5	350	Mature	.. ..	Roseleigh Senator
Craigmore Nancy ..	32130	240	4	5,175	4·56	235·8	250	Sr. 2	.. ..	Strathkellar Buster
Craigmore Sunbeam ..	30342	273	N.C.K.	7,191	4·18	300·9	330	Sr. 4	.. ..	Grandview Begonia's Hot Stuff
Craigmore Symbil ..	29286	273	N.C.K.	7,203	4·18	301·1	350	Mature	.. ..	Roseleigh Reality
Craigmore Theila ..	29287	273	N.C.K.	9,129	4·17	381·0	350	Mature	.. ..	Roseleigh Reality
Hicks, E. J., Blains, Jersey (1).										
Leven Brae A-do Betty ..	67625	273	N.C.K.	7,370	5·65	416·7	330	Sr. 4	.. ..	Werribee Mikado
Hodgins, G. E., Hastings, Jersey (4).										
Verjean Venus 2nd ..	74363	273	19	6,809	5·18	352·4	230	Jr. 2	306 ..	Jorian Great Boy
Verjean Verbena 2nd ..	74364	273	17	6,546	4·93	322·8	230	Jr. 2	.. ..	Jorian Great Boy
Verjean Veronica 2nd ..	79413	273	21	6,413	6·07	3·89	230	Jr. 2	.. ..	Ardleigh Prince Chut
Verjean Vienna	74366	273	16	5,273	5·86	309·2	230	Jr. 2	.. ..	Ardleigh Prince Chut
Hore, E., Leitchville, Jersey (4).										
Milvue Design's Bettwy's 2nd	Vol. 29	273	N.C.K.	7,019	5·17	362·9	230	Jr. 2	.. ..	Belgonia Suspense's Design
Milvue Design's Honesty 2nd	63099	273	N.C.K.	6,840	6·12	418·6	330	Sr. 4	336, 406, 452	Belgonia Suspense's Design
Milvue Design's Larkspur	63100	273	N.C.K.	7,409	6·03	446·4	330	Sr. 4	396, 394, 447	Belgonia Suspense's Design
Milvue Oxford's Queen ..	63102	273	N.C.K.	7,973	5·58	444·8	330	Sr. 4	278, 241, 394	Belgonia Suspense's Design
Hore, M. T., Horfield, Friesian (2).										
Elmar Plaid	C.R.	273	N.C.K.	7,980	2·89	230·6	270	Jr. 3	275 ..	Elmar Sylvia's Lad
Elmar Ruby	C.R.	273	N.C.K.	8,682	2·99	259·7	270	Jr. 3	332 ..	Burnbank Iona Rock
Hurrey, Estate of the late W. H., Koonwarra, Jersey (9).										
Burwood Cream Belle 3rd	60926	273	17	6,912	5·15	355·8	350	Mature	280, 349 ..	Kooreena Handsome Lad
Kooreena Audrey 15th ..	Vol. 29	273	13	5,955	6·67	397·2	290	Sr. 3	337 ..	Kooreena Good Luck
Kooreena Carrie 7th ..	58055	273	15	5,709	6·59	376·2	350	Mature	279, 239, 378, 420	Kooreena Carrie 3rd's Halo
Kooreena Glamour ..	62626	273	17	6,470	6·28	406·6	350	Mature	257, 435 ..	Kooreena Carrie 3rd's Halo
Kooreena Lotina 2nd ..	72279	273	12	6,158	5·67	349·4	290	Sr. 3	294 ..	Kooreena Good Luck
Kooreena Maranta 16th ..	62629	273	12	6,371	6·38	406·6	350	Mature	367, 398, 376	Kooreena Carrie 3rd's Halo
Kooreena Minerva 4th's Venus	67487	273	22	7,396	5·59	413·1	310	Jr. 4	304 ..	Kooreena Handsome Lad
Kooreena Trinket ..	C.R.	273	12	5,337	6·34	338·5	250	Sr. 2	.. ..	Kooreena Carrie 4th's Laddie
Kooreena Yo Yo 3rd ..	62631	273	19	6,739	5·69	383·5	350	Mature	314, 368, 339	Kooreena Mourier King 2nd
Jackson, H., Lockington, Jersey (1).										
Pine Ridge Molly 2nd ..	68652	273	29	10,152	5·71	579·2	330	Sr. 4	443, 497 ..	Duke of the Lake (Imp.)
Jefferson, E. L., Dandenong, Jersey (1).										
Finchley Lady Peerless 4th	71318	240	4	2,895	6·47	187·3	270	Jr. 3	.. ..	Finchley Masterman 2nd
Jones, A. C., Barnawartha, Illawarra Shorthorn (9).										
Coraldale Alice 6th ..	Vol. 8	251	4	6,094	4·01	244·6	250	Sr. 2	.. ..	Sunnyvale David
Coraldale Damsel 15th ..	Vol. 8	273	N.C.K.	6,058	4·26	258·1	290	Sr. 3	234 ..	Sunnyvale David
Coraldale Doris 9th ..	Vol. 8	273	N.C.K.	5,731	3·79	217·0	250	Sr. 2	.. ..	Sunnyvale David
The Forest Belle 10th ..	Vol. 8	273	N.C.K.	5,306	4·19	222·4	250	Sr. 2	.. ..	Wangoola Renown
The Forest Posy 11th ..	C.R.	273	..	5,625	3·68	206·8	250	Sr. 2	.. ..	The Forest Passport
The Forest Tot 2nd ..	Vol. 8	273	N.C.K.	5,523	3·49	192·6	250	Sr. 2	.. ..	The Forest Passport
Wangoola Matilda 2nd ..	Vol. 8	273	N.C.K.	5,898	3·86	227·5	290	Sr. 3	.. ..	Wangoola Rose's Discovery
Wangoola Polly 2nd ..	C.R.	240 (Sold)	..	4,598	3·98	182·8	290	Sr. 3	169 ..	Hillview Renown's Combination
Wangoola Sunflower ..	C.R.	273	N.C.K.	7,778	3·84	298·6	290	Sr. 3	204 ..	Hillview Renown's Combination

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Keele, H. A., Bamawn, Jersey (1).										
Waroin Gnome	74429	273	16	5,838	4·41	257·7	230	Jr. 2	.. ..	Waroin Cow Boy
Langlands, F. B., Horsham, Jersey (7).										
Brierwood Golden Maid ..	65637	273	N.C.K.	6,297	5·98	376·8	330	Sr. 4	.. ..	Murona Twylair
Brierwood Speedwell's Fairy	65638	273	N.C.K.	6,284	5·24	329·4	290	Sr. 3	.. ..	Murona Twylair
Brierwood Speedwell's Maid	75353	273	N.C.K.	6,632	5·19	344·3	250	Sr. 2	289 ..	Murona Twylair
Brierwood Twylish Countess	75354	273	N.C.K.	5,015	5·00	250·6	230	Jr. 2	.. ..	Murona Twylair
Brierwood Vanity 2nd ..	75356	273	N.C.K.	3,695	4·96	183·2	230	Jr. 2	.. ..	Orphanage Lady's Vanguard
Brierwood Volunteer's Fern	75357	180	N.C.K.	2,640	5·28	139·5	230	Jr. 2	.. ..	Murona Twylair
Brierwood Volunteer's Rose	70484	273	N.C.K.	7,457	5·09	379·7	330	Sr. 4	.. ..	Orphanage Lady's Vanguard
Le Noury, E., Werribee South, Guernsey (4).										
Werribee Miss Pat ..	9639	273	N.C.K.	6,845	4·53	310·4	230	Jr. 2	.. ..	Warrawong Wretch
Werribee Model Maid ..	8089	273	N.C.K.	6,204	4·62	286·4	330	Sr. 4	274, 312, 177	Werribee Prince Don
Werribee Souvenir ..	8091	273	N.C.K.	6,797	5·31	360·9	330	Sr. 4	274, 351, 321	Yarraview Commander
Werribee Miss Vanity ..	9640	273	N.C.K.	5,185	4·80	249·1	230	Jr. 2	.. ..	Warrawong Wretch
Linke, H. P., Tarrington, Dairy Shorthorn (1).										
Corresdean Fairy ..	Vol. 2	273	16	6,618	3·79	251·0	230	Jr. 2	.. ..	Drumneil Prince 3rd
Longerenong Agricultural College, Dooen, Ayrshire (5).										
Longerenong Acacia Elata 5th	30753	273	8½	6,973	3·97	277·1	310	Jr. 4	285 ..	Dookie Punch
Longerenong Cedar Wattle 7th	32769	273	19	5,996	3·88	232·7	230	Jr. 2	.. ..	Dookie Signet
Longerenong Cootamundra Wattle 5th	31617	273	15½	7,340	3·90	286·0	290	Sr. 3	285 ..	Longerenong Hero
Longerenong Laurustine 4th	31619	240	4	4,290	3·94	169·1	290	Sr. 3	204 ..	Dookie Punch
Longerenong Palm 4th ..	29742	273	N.O.C.	5,495	3·81	209·5	350	Mature	239, 310, 307	Dookie Punch
Lyon, W. H., Sale, Jersey (4).										
Avon Dolores	70074	273	N.C.K.	6,316	5·63	355·7	290	Sr. 3	252 ..	Avon Morning Star
Avon Elvie	Vol. 29	273	N.C.K.	5,748	5·63	323·7	270	Jr. 3	227 ..	Avon Morning Star
Avon Lady Viola ..	Vol. 29	150	N.C.K.	2,670	5·61	149·8	290	Sr. 3	221 ..	Avon Morning Star
Avon Lassie Golden ..	70076	273	N.C.K.	7,804	5·67	436·0	290	Sr. 3	253 ..	Ruby's Beau (Imp.)
Macauley, C. W., Rochester, Jersey (3).										
Taranah Chime 3rd ..	79099	273	18½	5,967	4·91	293·0	230	Jr. 2	.. ..	Taranah Reliance
Taranah Favourite ..	79100	273	17½	5,236	5·61	303·5	230	Jr. 2	.. ..	Taranah Champion
Taranah Radiance 2nd ..	59634	273	14½	7,298	5·59	407·7	350	Mature	348, 364, 527, 431	Taranah Commander
McCormack, M., and Sons, Mansfield, Red Poll (12).										
Chandpara Chevron ..	2629AA	210	N.C.K.	7,695	3·79	292·0	350	Mature	.. ..	Chandpara Valentine
Chandpara Poa	5371AA	273	N.C.K.	8,230	4·71	389·6	350	Mature	.. ..	Victoria John of Gaunt
Cypress Babs	3996B	273	N.C.K.	7,850	3·66	287·4	350	Mature	.. ..	Woodburn Glennie
Cypress Blonde	5116C	273	N.C.K.	8,720	4·51	392·9	350	Mature	.. ..	Woodburn Glennie
Cypress Bonzer	7072B	273	N.C.K.	6,684	3·93	262·8	250	Sr. 2	.. ..	Northwood Prior
Cypress Enid	5118C	273	N.C.K.	8,882	4·65	412·9	350	Mature	.. ..	Woodburn Glennie
Cypress Jewess	6803A	240	N.C.K.	5,250	4·52	237·2	290	Sr. 3	.. ..	Northwood Prior
Cypress Marsellaise ..	5121C	273	N.C.K.	9,558	3·55	339·7	350	Mature	.. ..	Woodburn Glennie
Cypress Midget	7697A	273	15	6,427	4·84	311·0	250	Sr. 2	.. ..	Northwood Prior
Cypress Nanette	4581A	240	N.C.K.	7,335	4·13	302·8	350	Mature	.. ..	Victoria Sovereign
Cypress Pet	7073B	273	N.C.K.	7,273	3·63	264·3	290	Sr. 3	.. ..	Victoria Sovereign
Cypress Pincher	7327AA	210	N.C.K.	5,025	4·92	247·3	230	Jr. 2	.. ..	Burnwood Whistler
McIrvale, I., and Sons, Camperdown, Jersey (4).										
Cumnock Christobel ..	C.R.	210 (Herd withdrawn)	..	6,330	5·68	359·3	310	Jr. 4	339 ..	Cumnock Governor General
Cumnock Hope	66125	240 (Herd withdrawn)	..	7,095	6·20	439·9	330	Sr. 4	235, 352 ..	Airlie Golden Lad
Cumnock Marigold ..	61244	273 (Herd withdrawn)	..	7,182	4·87	350·0	350	Mature	283, 195, 333	Cumnock Fancy Masterpiece
Cumnock Aster 2nd. ..	61238	240 (Herd withdrawn)	..	6,255	5·16	322·7	350	Mature	321 ..	Cumnock Fancy Masterpiece

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class	Previous Yields of Butter Fat.	Sire.
McKenzie, Mrs. E. J., and Sons, Woodford, Jersey (11).										
Kameruka Viking Sparkshine	67313	273	10½	5,525	6·05	334·3	270	Jr. 3	.. ..	Werribee Viking
Preston Fernleaf's Princess	41629	273	12	9,687	4·29	415·8	350	Mature	296, 426, 433	Preston Merry King
Selsey Sally 2nd ..	55212	273	12½	7,155	5·97	427·5	350	Mature	.. ..	Brampton Great Boy (Imp.)
Spring Valley Merle ..	46171	180	(died)	6,510	5·68	369·6	350	Mature	.. ..	Spring Valley Silver
Spring Valley Merle 4th ..	73915	273	8½	6,689	5·75	384·5	290	Sr. 3	.. ..	Selsey Great Peer
Spring Valley Rose Dream	69111	273	17½	5,171	5·93	306·4	290	Sr. 3	.. ..	Selsey April Boy
Spring Valley Virginia 5th	29066	273	12	5,955	6·02	358·4	350	Mature	.. ..	Noorat Flashlight Choice
Spring Valley Virginia 11th	41989	273	10½	7,634	6·04	460·9	350	Mature	.. ..	Spring Valley Cornflower's Noble
Spring Valley Virginia 17th	46176	273	6	7,541	5·52	416·5	350	Mature	.. ..	Clarendon Eyre Eminent's Pirate
Spring Valley Virginia 47th	78923	273	8	4,734	6·08	287·7	230	Jr. 2	.. ..	Pine Grove Larkspur King
Spring Valley Virginia 48th	78924	273	10	5,420	5·97	323·8	230	Jr. 2	.. ..	Pine Grove Larkspur King
McNabb, G. A., and Son, Irrewillipe East, Jersey (21).										
Avalon Madeira's Pansy 6th	65234	273	N.C.K.	8,479	4·99	423·0	290	Sr. 3	444, 481 ..	Mornmoot Prince Madeira
Avalon Starbright's Pansy 9th	70069	273	N.C.K.	6,381	6·07	387·6	250	Sr. 2	276 ..	Avalon Starbright 8th
Calembeen Princess Oglivia	56672	273	N.C.K.	8,239	4·67	384·8	350	Mature	.. ..	Latrobe Planet
Greenwood Plunder ..	71671	273	16	6,333	6·13	387·9	250	Sr. 2	.. ..	Greenwood Jimmy
Maxon Bright Bouvardia 2nd	77616	273	17	5,607	5·73	321·1	230	Jr. 2	.. ..	Maxon Starbright's Prince 5th
Maxon Bright Favourite 2nd	58343	273	N.C.K.	7,814	5·34	416·9	350	Mature	270, 331, 394	Maxon Starbright's Prince 5th
Maxon Chieftain's Bell ..	58345	273	N.C.K.	6,725	5·33	358·4	350	Mature	225, 291, 362	Maxon Chieftain
Maxon Chieftain's Comfrey 2nd	54016	273	N.C.K.	6,956	4·85	337·1	350	Mature	201, 329, 284, 335, 351	Maxon Chieftain
Maxon Chieftain's Lodestone 2nd	58347	273	12	6.441	5·06	325·7	350	Mature	314, 325, 388, 455	Maxon Chieftain
Maxon Count's Buttercup	77619	273	N.C.K.	5,415	5·94	321·5	230	Jr. 2	.. ..	Maxon Count Graceful
Maxon Count's Cornice ..	62997	273	13	5,844	6·03	352·3	330	Sr. 4	269 ..	Maxon Count Graceful
Maxon Count's Daisy 3rd	58349	273	N.C.K.	6,846	6·95	475·6	350	Mature	284, 298, 353	Maxon Count Graceful
Maxon Count's Favourite 7th	77621	273	16	4,985	5·69	283·8	230	Jr. 2	.. ..	Maxon Count Graceful
Maxon Count's Ranunculus	58352	273	N.C.K.	7,657	5·52	423·0	350	Mature	321, 360, 423, 398	Maxon Count Graceful
Maxon Graceful Duchess 4th	63001	273	N.C.K.	8,610	6·11	525·8	330	Sr. 4	230, 489 ..	Maxon Chieftain
Maxon Handsome Alsyke	77623	273	N.C.K.	4,187	6·82	285·4	230	Jr. 2	.. ..	Maxon Handsome Boy
Maxon Handsome Light ..	77632	273	13	4,689	6·28	294·4	230	Jr. 2	.. ..	Maxon Handsome Boy
Maxon Linnacre's Alsyke ..	63002	273	18	6,999	6·08	425·6	330	Sr. 4	194, 405 ..	Maxon Linnacre's Starbright 2nd
Maxon Linnacre's Clara ..	63003	273	11	6,243	5·66	353·2	330	Sr. 4	167, 351 ..	Maxon Linnacre's Starbright 2nd
Maxon Noble's Ranunculus 2nd	67854	273	24	9,154	5·36	490·5	310	Jr. 4	400, 444 ..	Maxon Duchess' Noble
Maxon Starbright's Pansy 2nd	77634	273	N.C.K.	4,680	5·15	241·0	230	Jr. 2	.. ..	Avalon Starbright 8th
Maher, R. H., Tongala, Jersey (2).										
Rosemont Duchess Fowler	59283	273	22	6,636	4·70	311·8	350	Mature	339, 294 ..	Rosemont Golden Emblem
Rosemont Lady Fowler 9th	50459	273	19¼	6,254	4·51	281 9	350	Mature	254, 239, 291, 299	Duke of the Lake (Imp.)
Manly, R. A. A., Somerville, Dairy Shorthorn (1).										
Braelands Princess Rose 17th	Vol. 2	273	29	9,689	3·81	369·4	250	Sr. 2	.. ..	Morven Lord Cressida 4th
Mason, .V J., Ferntree Gully, Guernsey (2).										
Roads End Jeanne ..	4803	273	N.C.K.	9,806	5·22	512·3	350	Mature	468 ..	Glenburnie Ideal (Imp.)
Roads End Patrice ..	4805	273	N.C.K.	8,393	5·12	429·4	350	Mature	485 .	Glenburnie Ideal (Imp.)
Meaklim Bros., Mooroopna, Dairy Shorthorn (1).										
Drumnell Pearl 3rd ...	Vol. 2	273	N.C.K.	9,096	3·46	314·5	250	Sr. 2	.. ..	Willow Park Lustre 3rd
Methodist Central Mission, Lilydale, Guernsey (1).										
Melbourne Colette	7412	273	10	5,202	4·58	238·3	310	Jr. 4	112 ..	Yarraview Sequel's Slogan
Mitchell, R. H., Linton, Jersey (3).										
Clifford Farm Angeline ..	75659	273	23½	7,752	5·30	410·7	230	Jr. 2	.. ..	Tavistock Quality Lad
Clifford Farm Maple ..	75661	273	21½	7,118	6·00	427·2	230	Jr. 2	.. ..	Clifford Farm Flashlight
Clifford Farm Viola ..	61103	273	21¼	7,908	5·91	467·2	350	Mature	317, 401 ..	Wompini V.C.
Moore, J., and Co., Yarram, Jersey (6).										
Tooloonook Camille 2nd ..	79248	273	N.C.K.	3,789	4·53	171·8	230	Jr. 4	.. ..	Belgonia Lady's Duke
Tooloonook Molly 12th ..	59758	273	N.C.K.	5,441	4·41	239·9	350	Mature	256, 241, 322, 280	Anfield Diadem's Masterpiece
Tooloonook Molly 16th ..	69398	273	N.C.K.	4,548	5·72	260·3	310	Jr. 2	276, 203 ..	Latrobe Musician
Tooloonook Peach 16th ..	Vol. 29	273	N.C.K.	4,286	4·00	171·5	230	Jr. 2	.. ..	Belgonia Lady's Duke
Tooloonook Sanfoin 8th ..	Vol. 29	273	N.C.K.	3,720	5·01	186·4	230	Jr. 2	.. ..	Belgonia Lady's Duke
Tooloonook Virginia 5th ..	64605	273	N.C.K.	5,491	4·89	268·5	330	Sr. 4	189, 270 ..	Heroic of Somerville

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Murdoch, J., and Son, Lismore, Jersey (1).										
Ismalia Countess 2nd ..	67120	273	17½	7,628	5·91	450·5	290	Sr. 3	293 ..	Retford King Bracken
Nash, L., Launching Place, Jersey (7).										
Devon Glen Eucalyptus ..	71018	273	N.C.K.	4,805	5·19	249·2	250	Sr. 2	291 ..	Selsey Right Royal
Devon Glen Marchflower 2nd	75956	180	N.C.K.	2,325	5·55	129·0	250	Sr. 2	.. ..	Ashcombe Hero
Devon Glen Rosalie ..	75957	273	13	4,914	4·93	242·1	230	Jr. 2	.. ..	Wonga Park Song King
Elm Grove Augusts's Dawn	Vol. 29	273	N.C.K.	5,490	5·68	311·9	250	Sr. 2	.. ..	Glen Iris Golden Man
Elm Grove Jessie Fowler 3rd	43736	273	N.C.K.	8,516	5·35	455·5	350	Mature	289, 401, 497, 512	Warenda Ragtime Dominant
Elm Grove La Monte ..	C.R.	273	N.C.K.	5,941	5·22	310·4	290	Sr. 3	266 ..	Glen Iris Golden Man
Elm Grove Veronique ..	57177	240	N.C.K.	4,612	5·68	261·8	350	Mature	223, 323, 416, 441	Elm Grove Starlight
Nicholas, M. A., Sherbrooke, Jersey, (2).										
Selsey Cute Wyandotte ..	69058	273	14½	5,294	6·68	353·6	290	Sr. 3	327, 327 ..	Samare's Golden Prince (Imp.
Selsey Weigelia	55214	273	18½	6,615	5·86	387·9	350	Mature	295, 310, 404, 358	Brampton Great Boy (Imp.)
Noble, T. M., and Son's, Maffra, Jersey (2).										
Finchley Handsome Lady 2nd	43886	273	N.C.K.	8,390	6·66	558·5	350	Mature	276, 415, 480, 504, 445, 454, 491	Finchley Lord Harmony
Finchley Lady Peerless ..	39742	273	N.C.K.	7,580	6·12	464·1	350	Mature	397, 367 ..	Werribee Lord Burnham
O'Neill, J., Echuca Village, Jersey (1).										
Ulina Bonnie	69475	273	21½	7,543	6·07	457·7	330	Sr. 4	334, 303 ..	Ballara Fancy King
Parker, L. M., Tallarook, Dairy Shorthorn (10).										
Deep Dale Daisy ..	Vol. 2	273	25	9,765	3·96	386·8	350	Mature	.. ..	Willow Park Banker 3rd
Deep Dale Daphne ..	Vol. 2	273	23	9,656	3·88	374·3	350	Mature	439 ..	Willow Park Banker 3rd
Deep Dale Fairy ..	Vol. 2	273	10½	9,065	4·03	365·5	290	Sr. 3	297 ..	Willow Park Banker 3rd
Deep Dale Gem ..	Vol. 2	273	20	9,211	4·13	380·5	330	Sr. 4	324 ..	Willow Park Banker 3rd
Deep Dale Peach ..	Vol. 2	273	22½	9,807	4·42	433·1	350	Mature	.. ..	Willow Park Revenue
Deep Dale Rachael ..	Vol. 2	273	17	9,061	3·74	338·7	350	Mature	312 ..	Willow Park Banker 3rd
Deep Dale Renie ..	Vol. 2	273	18	9,969	4·02	400·3	350	Mature	.. ..	Willow Park Banker 3rd
Deepdale Rose	Vol. 2	273	24	8,462	3·88	328·0	250	Sr. 2	.. ..	Willow Park Barrington 26th
Deep Dale Star	Vol. 2	273	17	6,673	4·51	301·0	290	Sr. 3	299 ..	Willow Park Banker 3rd
Deep Dale Strawberry ..	Vol. 2	273	17	9,516	4·16	396·2	270	Jr. 3	232 ..	Willow Park Barrington 26th
Parks, L. A., and Sons, Romsey, Guernsey (1).										
Melbourne Golden Gem ..	4501	273	10	5,805	4·97	288·3	350	Mature	263, 335, 299, 327, 480, 381	Nundorah Climax
Payne, A. E. T., Lilydale, Guernsey (2).										
Yarraview Beryl ..	8197	273	27	10,959	4·80	526·0	330	Sr. 4	485, 560 ..	Honoria's Benefactor (Imp.)
Yarraview Souvenir ..	3568	273	24	9,623	4·85	467·0	350	Mature	517, 290, 358, 424	Camilla's Majestic of Maple Lodge (Imp.)
Read, Estate of the late J. D., Springhurst, Jersey (26).										
Springhurst Anemone's Duchess	73921	273	14½	6,408	5·29	339·2	230	Jr. 2	.. ..	Glen Iris Anemone's Standard
Springhurst Ashley Narcissus	69122	273	9	5,937	5·75	341·1	250	Sr. 2	291 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Ashley Romneya	73922	273	14	5,599	5·58	312·6	230	Jr. 2	.. ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Ashley Tecoma	69123	273	10	6,245	4·95	309·4	250	Sr. 2	275 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Ashley Tulip ..	69125	273	12	6,312	5·64	355·8	250	Sr. 2	227 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Blonde Nardoo	59485	273	16½	8,172	6·35	519·1	350	Mature	318, 488, 448	Bellefaire Seaborn Successor
Springhurst Blonde Nightshade	59486	273	20	8,513	5·82	495·5	350	Mature	338, 496, 503	Bellefaire Seaborn Successor
Springhurst Blonde Romneya	55272	273	16	8,802	5·97	525·9	350	Mature	377, 399, 523, 463	Bellefaire Seaborn Successors
Springhurst Boutillere ..	64270	273	19	8,764	5·23	458·1	290	Sr. 3	336, 424 ..	Glen Iris Anemone's Standard
Springhurst Brampton Tulip	64274	273	12½	6,924	5·25	363·3	290	Sr. 3	281, 263 ..	Glen Iris Anemone's Standard
Springhurst Coronation Narcissus	50625	273	19	8,803	6·02	529·6	350	Mature	317, 428, 429, 519, 585	Springhurst Design's Analyst
Springhurst Cuban Tecoma	73924	273	10	4,883	5·53	270·2	230	Jr. 2	.. ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Glad Brinjal ..	64277	273	19½	8,397	5·33	447·3	310	Jr. 4	359, 381 ..	Springhurst Sybil's Successor
Springhurst Hussy Alsyke	50630	273	14½	7,158	5·98	427·8	350	Mature	285, 403, 391, 448	Bellefaire Seaborn Successor
Springhurst Pet Tomato ..	64282	273	17½	9,053	5·22	472·7	310	Jr. 4	344, 409 ..	Glen Iris Anemone's Standard
Springhurst Phillidora's Alsyke	73928	273	12½	6,626	5·66	375·1	230	Jr. 2	.. ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Phillidora's Narcissus	73929	273	17	6,950	4·94	343·0	230	Jr. 2	.. ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Phillidora's Tulip	69128	273	12	5,256	6·11	321·3	270	Jr. 3	224 ..	Twin Oaks Ashley Fern's Noble (Imp.)

Standard Herd Records—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Read, Estate of the late J. D., Springhurst, Jersey (26).—*continued.*										
Springhurst Ronald's Alsyke	59498	273	20	8,917	6·49	578·9	350	Mature	365, 545, 435	Bellefaire Seaborn Successor
Springhurst Ronald's Duchess	64283	273	25½	9,496	5·85	555·3	310	Jr. 4	495, 549 ..	Springhurst Sybil's Successor
Springhurst Soeurette's Lily	69129	273	15	7,442	5·25	390·5	250	Sr. 2	322 ..	Bellefaire Superlative Pride
Springhurst Soeurette's Tulip	73931	273	20	8,147	4·93	402·0	230	Jr. 2	.. ..	Bellefaire Superlative Pride
Springhurst Sybil Tulip ..	55281	273	16½	7,417	6·33	469·4	350	Mature	329, 425, 492, 513, 450	Springhurst Golden Gamboge
Springhurst Volunteer's Nardoo	73934	273	14	5,856	6·02	352·3	230	Jr. 2	.. ..	Springhurst Tomatoe's Volunteer
Springhurst Wesford Tomato	69132	250	4	5.132	5·69	292·1	250	Sr. 2	254 ..	Twin Oaks Ashley Fern's Noble (Imp.)
Springhurst Zenia's Narcissus	64289	273	18	7,707	5·66	436·6	290	Sr. 3	229, 330 ..	Glen Iris Anemone's Standard
Ross, D. M., Croydon, Dairy Shorthorn (1).										
Willow Park Duchess 43rd	Vol. 2	273	N.C.K.	6,991	4·09	286·1	230	Jr. 2	.. ..	Willow Park Barrington 58th
Sadler, R. W., Noorat, Ayrshire (2).										
Burnbrae Annie 2nd ..	30223	273	12	5,518	4·93	271·8	350	Mature	.. ..	Ecclefechan Lionel
Burnbrae Aspro	C.R.	273	9	3,462	4·70	162·6	230	Jr. 2	.. ..	Kerlie Park Luminous
Sambell, A. K. T., Phillip Island, Dairy Shorthorn (2).										
Trenavin Park Fairy 3rd ..	C.R.	240	4	7,335	3·80	278·4	250	Sr. 2	241 ..	Willow Park Barrington 21st
Trenavin Park Princess ..	Vol. 2	273	N.C.K.	5,082	4·40	223·6	250	Sr. 2	.. ..	Willow Park Barrington 21st
Stephens, Dr. F. G., Vermont, Guernsey (2).										
Vermont Mayfair ..	8010	273	18½	5,466	5·34	291·7	290	Sr. 3	.. ..	Vermont Camilla's Sunrise
Vermont Una's Princess ..	5188	240	N.O.C.	7,300	4·56	333·2	350	Mature	339, 407, 279, 479	Camilla's Majestic 2nd of Maple Lodge
Stirling, H. V., Meade, Jersey (1).										
Colmba Silvermine 2nd ..	Vol. 29	273	16	5,414	4·74	256·5	230	Jr. 2	.. ..	Banyule Statoscope
Tait, W. G., Dreelte, Jersey (4).										
Stonybank Jessie 6th ..	73962	273	11½	5,258	6·11	321·2	230	Jr. 2	.. ..	Mornmoot Marius 2nd
Stonybank Snowdrop 2nd	50656	273	19	6,824	6·65	453·5	350	Mature	420, 497, 324	Melrose Curio
Stonybank Snowdrop 5th	73964	273	17	7,611	5·83	443·9	250	Sr. 2	288 ..	Mornmoot Marius 2nd
Stonybank Snowdrop 6th	73965	273	24½	7,130	5·63	401·3	230	Jr. 2	.. ..	Mornmoot Marius 2nd
Thomas and Taylor, Hamilton, Ayrshire (1).										
Carracoorte Betsy 22nd ..	24674	273	28	11,049	4·51	525·4	350	Mature	313, 389, 355, 393, 421, 418	Blue Bell's Pride of Glencourt
Tomasetti, B. G., Drouin West, Ayrshire (2),										
Glencorren Belle	28444	273	19	7,829	4·66	365·1	350	Mature	268, 349, 372, 419, 376	Gowrie Park Scottish Emblem
Glencorren Lady ..	Vol. 34	273	4	6,867	3·90	267·9	290	Sr. 3	274 ..	Glen View Sultan
Trewin, J. V., Nathalia, Jersey (2).										
Wier View Golden Duchess	51161	273	25	6,465	4·86	314·1	350	Mature	385, 398, 440, 441, 477, 392	Duke of the Lake (Imp.)
Weir View Northern Princess 2nd	74482	273	20	5,040	4·95	249·5	230	Jr. 2	.. ..	Carelian Northern Duke
Tyssen, C. J., Warragul, Jersey (5).										
Hylsbroke Air Lady 9th ..	76880	273	9	3,432	4·80	164·7	230	Jr. 2	.. ..	Latrobe Skyplane
Hylsbroke Jolly Lassie ..	44374	252	4	7,059	5·09	359·6	350	Mature	381 ..	Joystick of Banyule
Hylsbroke Jolly Lassie 6th	76882	273	N.C.K.	6,795	4·68	318·2	230	Jr. 2	.. ..	The Wattles Young Gamboge
Hylsbroke Joy Step ..	48733	273	N.C.K.	7,313	5·67	414·6	350	Mature	.. ..	Joystick of Banyule
Lancefield Bonnie Dinah ..	67536	273	14	5,404	4·97	268·4	350	Mature	340 ..	Gadget (Imp.)
Vagg, E. J., Leongatha, Jersey (1).										
Bonnay Stella's Daisy ..	Vol. 29	273	15	6,428	5·42	348·1	250	Sr. 2	.. ..	Selsey Brampton Boy
Vaughan Bros., Girgarre, Jersey (3)										
Lynroy Coral	C.R.	273	12	4,341	6·04	262·0	230	Jr. 2	.. ..	Werribee Laverock
Lynroy Glen	C.R.	273	7	4,670	6·49	303·0	230	Jr. 2	.. ..	Werribee Laverock
Lynroy Sprite 2nd ..	62372	273	17½	7,088	5·93	423·7	330	Sr. 4	354 ..	Lynroy Gladiator
Wade, W. J., Stratford, Jersey (2).										
Inverbroom Empress 6th ..	57761	273	N.C.K.	7,613	5·61	427·3	350	Mature	277, 291, 415	Economist of Aveley
Inverbroom Silver Empress	48764	373	N.C.K.	7,244	4·21	305·0	350	Mature	304, 362, 342, 291, 202	Inverbroom Lord Emperor

STANDARD HERD RECORDS—*continued.*

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Walker, C. S., Swan Hill, Friesian (2).										
Warwick Leonora Walker	Vol. 15	273	36	16,368	3·15	515·0	350	Mature	259, 349, 521, 400	Hengest Matador Walker
Warwick Lizzie Oakwood	6104	273	36½	18,740	3·18	596·5	350	Mature	302, 487, 532, 617	Hengest Lizzie Segis
Walker, C. S., Swan Hill, Jersey (5).										
Grangelea Golden 5th ..	66757	273	N.C.K.	5,762	5·24	302·2	350	Mature	251, 341, 336	Grangelea Prosper 5th
Warwick Augustus Marie 7th	69626	273	N.C.K.	8,139	4·67	380·4	290	Sr. 3	370 ..	Warwick Golden Lord
Warwick Cream Stockings 6th	79525	273	16½	6,500	5·22	339·0	250	Sr. 2	330 ..	Warwick Golden Lord
Warwick Polly 11th ..	74450	273	N.C.K.	6,741	4·51	303·7	270	Jr. 3	266 ..	Warwick Golden Lord
Warwick True Love ..	79533	273	N.C.K.	5,412	5·42	293·4	250	Sr. 2	.. ..	Leven Brae A'Do Masterpiece
Waterhouse, H. W., and Son, Pakenham, Jersey (3).										
Navuloa La Harebell ..	73097	273	18	6,804	5·34	363·4	250	Sr. 2	348 ..	Staghorn Laburnum's Masterpiece
Navuloa Master's Fancy ..	63363	273	17	7,958	5·80	461·5	330	Sr. 4	476 ..	Werribee Grandmaster
Willis Vale Brigadier's Magnet	42509	273	19	9,613	5·32	511·0	350	Mature	515 ..	Clarendon Eyre Eminent's Brigadier
Watson, K. E., Gembrook, Jersey (1).										
Goronga Farm Empress Daffodil	66743	273	N.C.K.	6,187	4·84	299·3	350	Mature	199, 356 ..	Somerville Reputed King
Whelpton, B., Whittlesea, Jersey (4).										
Hemswell Janice ..	C.R.	273	18	6,180	4·60	284·3	230	Jr. 2	.. ..	Clarendon Eyre Eminent's Moon 2nd
Hemswell Norma 2nd ..	C.R.	273	16	6,488	5·73	371·8	230	Jr. 2	.. ..	Clarendon Eyre Eminent's Moon 2nd
Hemswell Prude 2nd ..	C.R.	273	16	5,150	5·89	303·5	230	Jr. 2	.. ..	Clarendon Eyre Eminent's Moon 2nd
Jubilee Canna	53393	210 (Sold)	..	4,192	5·39	225·8	350	Mature	432 ..	Jubilee Asterlight
Whitehead, E. J., and Sons, Beaconsfield, Jersey (1).										
Selsey Ellen 3rd	78875	273	10	3,712	4·92	182·5	250	Sr. 2	200 ..	Brampton Son of Champions (Imp.)
Williams, F. A., Bamawn Extension, Jersey (1).										
Bamawn Fancy Gem 3rd	Vol. 29	273	13	4,992	6·51	324·9	250	Sr. 2	.. ..	Bamawn Bonnie Bugler
Wilson, A., Port Fairy, Ayrshire (2).										
Gowrie Park Ivy ..	Vol. 34	210	N.O.C.	3,870	3·72	144·0	250	Sr. 2	.. ..	Stony Park Ivan
Lough View Bellona 2nd ..	Vol. 34	210	N.C.O.	4,560	4·35	198·5	250	Sr. 2	.. ..	Carracoorte Bobby

Note.—The cow Ballam Princess, owned by Mrs. A. A. Dennis, Frankston, was erroneously inserted as Ballam Laura in the Herd Records ended 31st December, 1941, published in the March, 1942, issue of this Journal.

Use of Tourniquet to Control Bleeding.

Bleeding from wounds in animals may be so profuse at times that direct pressure exerted by the cleansed finger or bandage is not sufficient to check it.

If the wound is on a limb or the tail, indirect pressure can be applied by means of a tourniquet. This can be improvised from a piece of string or soft rope, a length of bandage, or a piece of rubber, &c., formed into a loop around the limb above the wound, and twisted up tight enough to stop the circulation. Twisting may be done by means of any rigid object such as a piece of wood.

A tourniquet must always be fastened tightly enough to stop the circulation completely. If applied only tight enough to stop venous circulation but, leaving the arteries open, the bleeding may be made worse. The tourniquet should not be left in position longer than is absolutely necessary or the tissues of the lower part will die.

It should be borne in mind that a tourniquet is to be applied only until more permanent measures can be taken for the control of haemorrhage.

Contents.

JULY, 1942

		Page
Pasture Plant Research at Burnley—1941 Report	*F. R. Drake, B.Agr.Sc.*	329
Wartime Vegetable Growing at Home		337
Fodder Conservation Competition, Maffra District	*G. B. Rayner, B.Agr.Sc.*	343
Drainage of Pig Sties		346
Black Disease of Sheep	*W. D. Shaw, G.M.V.C., B.V.Sc.*	347
Brucellosis-free Herds (Swine)		350
Fodder Conservation Competition, Swan Hill District	*A. Morgan, B.Agr.Sc.*	351
Organic Matter in the Orchard		355
1942–43 Potato Crop—Big Increase in Acreage Required		356
Pitting Potatoes	*J. T. Ramsay*	357
Blossom-killing Sprays for Apple Trees	*C. E. Cole, B.Agr.Sc., and D. M. McAlpin, B.Agr.Sc.*	359
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	363
Poultry Feeding Experiments	*A. C. T. Hewitt, M.Agr.Sc.*	367
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	374
Garden Notes	*J. L. Provan, B.Agr.Sc.*	375
The Gooseberry Weevil	*T. W. Hogan, B.Agr.Sc.*	377
Marmalade	*Rachel M. Peile*	379
Punctured Wounds in Horses' Feet		381
Pullorum-free Flocks (Poultry)		382
Tubercle-free Herds (Dairy Cattle)		383

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

The articles in the *Journal of the Department of Agriculture of Victoria* are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The *Journal* is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES.

The postage required for this issue is :—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

HAVELOCK

Fine Cut Tobacco

INDEX TO ADVERTISEMENTS

FRONT SECTION

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. v

Law Somner Pty. Ltd. (Seeds) ... opp. p. 336

Leggo, Victor, & Farmers Ltd. ... inside cover

Vacuum Oil Co. Pty. Ltd. .. opp. p. 337

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ii

BACK SECTION

Ajax Insurance Company Ltd. ... outside cover

Australian Cement Ltd. ... ... inside cover

Cameron & Sutherland Pty. Ltd. ... opp. p. 377

Cockbill, J. vii

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 376

Nightingale, A. G. & Co. (Nursery Stock for sale) vii

State Savings Bank ... . opp. p. 377

Trewhella Bros. Pty. Ltd. viii

Victorian Railways vii

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Pasture Plant Research at Burnley

REPORT FOR 1941

By F. R. DRAKE, B.Agr.Sc., Assistant Agrostologist

PASTURE plant investigation work has been in progress at Burnley since 1928. The work is largely concerned with the study of strain variation in the more important pasture species in common use in Victoria. The Seed Certification Schemes at present in operation in Victoria for special strainsof perennial rye grass, subterranean clover, white clover, and *Phalaris tuberosa*, are based on the results of this work. In addition to continuing the strain investigations, many "growing on" trials in connexion with these schemes are included in each year's planting.

In this report, the work in progress is dealt with first under the headings of the individual species, followed by descriptions of trials and activities of a more general nature.

Climatic Conditions.

Rainfall distribution during the year was somewhat erratic. Although the total rainfall for the year—31.53 inches, was approximately 5 inches in excess of the average, its distribution did not favour normal growth of most pasture species.

Monthly rainfall totals for the Burnley Gardens were as follow:—

January ..	596	July ..	243
February ..	81	August ..	238
March ..	231	September ..	345
April ..	245	October ..	148
May ..	136	November ..	162
June ..	410	December ..	318

Total—3,153.

Perennial Rye Grass.

Work is now largely confined to "growing on" trials in connexion with seed certification, together with trials with various imported and locally grown (not certified) lines. Plots are as follow:—

1940 Single Plant Ryes—252 plots of 50 plants.

1941 Single Plant Ryes—80 plots of 50 plants.

For the 1940 series counts of deaths were made in May, 1941. The results (percentage deaths in each group) are given in Table 1 with the figures for the 1939 series for comparison.

Table 1.

Group.	Original Number of Plants.	Deaths.	Deaths 1939 Series by June, 1940.
		%	%
New Zealand Certified ..	891	0·2	0·4
Victorian Certified—			
Colac	3,406	0·8	0·5
Clunes	4,437	0·4	0·1
Kyneton	694	0·1	Nil
Other Districts ..	841	0·8	0·7
Irish	147	5·5	0·7
New Zealand Uncertified	49	28·0	59·0

The above figures show the usual small percentage of deaths for certified lines, both Victorian and New Zealand.

For the 1941 series, examination of the plants at flowering time and after cutting back indicated that all Victorian certified lines "grown on" were satisfactory. Included in this year's plots were nine lots from irrigation areas—fields harvested primarily for irrigation white clover—but containing much rye grass also. Several of these lines are practically pure perennial, but in others varying amounts of Italian rye occur. Trials with "irrigation" seed generally show the presence of a good deal of Italian, this species being able to persist indefinitely and spread under irrigation conditions. Because of this, it would appear to be unwise to certify as perennial, any rye grass from irrigation country, even after satisfactory growing on trials, as the composition of such pastures is so liable to change. Seed from such fields, however, has proved very satisfactory for sowing in the northern irrigation areas.

A regional strain trial to study seasonal growth and comparative yields of strains from Victoria, New South Wales, Tasmania and New Zealand was sown in April, 1941. The plots became well established and systematic cutting and weighing will be commenced this year.

Annual Rye Grasses—Wimmera and Italian.

Twenty-four plots of 50 single plants, including commercial "Wimmeras," "Wimmera" selections, and Italian ryes were used in these trials. Flowering date observations were made, involving the noting of the flowering date for every plant, and from these figures a mean date was calculated for each plot. The Burnley early, mid-season, and late flowering groups have been reselected each year to a particular flowering date for each group, and are now breeding fairly true in regard to this character. The early group flowers approximately two weeks earlier than the average commercial line, and flowering is practically over in the former before it commences in the latter.

The two Italian plots (Commercial and New Zealand Certified) flowered approximately three weeks later than the mean for commercial Wimmera. The New Zealand Certified line appeared to be a little bulkier and leafier than the uncertified and also flowered a little later. Differences between the two, at least under our conditions, were not striking.

Subterranean Clovers.

Plots were as follow:—

Previously grown lots	85 plots
Miscellaneous new samples ..	11 „
"Growing on" trials (seed certification)	15 „

An extensive collection of subterranean clover varieties has been grown at Burnley since 1929 and added to by fresh collections from time to time. Up to the present over 50 distinct types have been separated and described. These are grown each year, to maintain the collections and for purposes of comparison with new samples grown. In the new samples grown in 1941, no type not already described was found.

Two varieties—"Tallarook", late flowering, and "Bacchus Marsh", early flowering, are grown under certification in Victoria, and

Rye grass strain investigation plots.

Cocksfoot strain trials.

"growing on" trials are part of the certification scheme. A generally high standard of trueness to type is shown in the "Tallarook" fields, but in several cases plants of another type—usually "Mount Barker"—have appeared and shown a tendency to increase. Where this has occurred approval of the fields has been withdrawn. "Growing on" trials with the "Bacchus Marsh" fields have shown a consistently high purity with no off-type plants.

Cocksfoot.

General observations including flowering dates were made on the cocksfoot collection planted 1939, including Victorian, Danish, New Zealand Certified, and New Zealand Lincoln College lines. Flowering date "means" showed the usual rather small but fairly constant differences, Danish being earlier than New Zealand Certified, and the two Victorian lines flowering at about the same time as Danish. The Lincoln College rows indicate that their breeding work is directed toward the developing of a pasture type—a small to medium sized plant with a dense crown and rather short leaves, these being definitely narrower than usual for cocksfoot. These rows show a distinctly lighter green colour than the other cocksfoot rows. While plants of this type are fairly numerous in each of the four Lincoln College rows, they by no means predominate, and a uniform true breeding line has not yet been developed. The rows in general, however, tend towards fine leaf and a dense habit of growth. It is difficult to judge the probable performance of this type from observations on single plants—sward plots of a type which experience has shown cannot be established at Burnley would be required. The impression is gained, however, that some of the size and vigour characteristic of Victorian and ordinary New Zealand Cocksfoot has been sacrificed in favour of the theoretical "ideal pasture type".

White Clover.

1. Single plant plots—sown 1941—30 lots.
2. Strain yield trials—broadcast plots.

In the single plant trials, a fairly extensive range of white clovers was grown, including Kentish, White Dutch, Ladino, New Zealand Uncertified, certified mother seed and pedigree, together with 20 Victorian Irrigation lots. Earlier work has shown that a special type of white clover, particularly suited to the conditions prevailing in irrigated pastures has developed in northern Victoria. This is a long lived type of plant, with long stout runners, long internodes, and large leaves on long stalks (petioles). This year, measurements of the spread of each plant at flowering time, and of the size of each part (leaf, internode, petiole, and peduncle) were made, in an attempt to devise a system of

Species association trials.

classification based on these measurements. In general, a fairly good correlation between these measurements for any one plant was found to occur—with long internode plants the other measurements tend to be correspondingly large. All such measurements, however, are affected to a very great degree by conditions of growth, and comparisons between lines can be made only if all measurements are made at about the same time, or at a similar stage of growth, and on plants grown under uniform conditions. With these conditions fulfilled, it is possible to interpret these measurements as a fair indication of type. Mean measurements (in inches) for a selected range of the lots grown in 1941 are given in Table 2.

Definitely larger measurements for spread and all parts are shown by the irrigation lines when compared with other lines. The line approaching most closely the Victorian Irrigation is New Zealand Certified Pedigree, this plot containing several plants which on appearance as well as measurement, could be classed as the true irrigation type. Flowering date "means" do not show any marked differences, with the exception of Kentish—a little later than the others.

Some variation from plant to plant is apparent in all the Victorian irrigation lines, but the best of them consisted wholly of plants of the true "irrigation" type. In other lines varying proportions of smaller growing plants were present, most of these being from fields sown originally with imported seed and in which the irrigation type is appearing voluntarily.

White Clover Strain Yield Trials.

Five strains of white clover in replicated plots were sown in September, 1938, and watered during summer. These plots became heavily infested with volunteer grass growth during the winter of 1941 and were cut for the last time on 9th July. They have been replaced by a new series sown on 16th October, 1941. Yields in pounds dry, of pure clover for each strain for the four years of the trial are shown in Table 3 on the following page.

TABLE 2.

Plot.	Average Spread.	Internode.	Leaf.	Petiole (Leaf Stalk).	Peduncle (Flower Stalk).	Mean Flowering Date.
Kentish	13·4	0·65	0·5	1·9	2·8	10/11
White Dutch	11·3	0·6	0·64	2·1	3·2	4/11
N.Z. Uncert.	13·5	0·66	0·6	2·3	3·0	2/11
N.Z. Cert. M/S	14·6	0·81	0·7	2·4	3·9	1/11
N.Z. Cert. Ped.	17·8	0·9	0·78	3·05	3·77	3/11
I.W. 1	21·8	1·12	0·92	3·6	4·9	30/10
I.W. 3.A. } Cert. Irrig. Lines	19·2	1·01	0·8	3·1	4·7	31/10
I.W. 5	19·0	0·96	0·8	3·1	4·5	27/10

Over the full period, the Victorian Irrigation type gave the highest yield, with Ladino and New Zealand Certified not far behind. During the last two seasons Ladino was slightly ahead, and showed no sign of being other than a persistent type, at least over the period of this trial. Kentish also is a highly persistent type, tending to improve rather than deteriorate with age. The white Dutch plots, on the other hand were badly thinned out by the end of the trial.

TABLE 3.

Strain.	1938.*	1939.	1940.	1941.*	Total.
New Zealand Certified	15·9	41·8	43·9	14·5	116·1
Victorian Irrigation	19·8	48·4	48·7	13·9	130·8
White Dutch ..	10·2	37·2	31·0	8·9	87·3
Kentish ..	2·3	23·1	36·3	12·6	74·3
Ladino	12·5	41·1	49·2	17·0	119·8

* Part of year only.

Lucerne.

A frequency of cutting trial to determine effect of cuts at various intervals on yield and persistence of lucerne was continued. Cuts and yields for 1941 are shown in Table 4.

The yields are of lucerne only, miscellaneous herbage cut being disregarded. The yields from the two- and four-weekly and hay cuts are in accordance with expectations and show the depressing effect of frequent cutting on yield of lucerne. The frequently cut plots carry heavy volunteer clover and grass growth and the lucerne in addition to being weakened by cutting, is subject to heavy competition also and the plants are already dying out. A rather surprising feature of the trial is the good yield from the system of cutting whenever growth reaches 6 inches in height. This system involves cutting at intervals of four to six weeks through the growing season, but also involves a spell of four months (early April to early August) during the winter. The results indicate that lucerne is damaged more by regular cutting during the semi-dormant period, than by frequent cutting through the main growing season. These 6-inch cut plots competed well with volunteer growth during the winter, but now carry rather more water couch than do the hay plots.

TABLE 4.—LUCERNE FREQUENCY OF CUTTING TRIAL.

Cut.	Yield (green).
	lb.
1. Every two weeks	45·2
2. Every four weeks	78·1
3. Whenever growth reaches 6 inches	147·0
4. Hay (early flowering)	131·5

Subterranean clover plots.

Rape and Other Crucifers.

A. Sown December, 1940—transplanted early February, 1941. Collection of fourteen lines, variously described as Kangaroo and Dwarf Essex, and including both imported and Victorian grown seed.

Two main types of plant were noted—the giant or "Kangaroo" and the smaller "dwarf Essex." Most plants could be readily classified as one or the other, although indeterminate types occurred in some lines. "Kangaroo" grows more rapidly than does "Essex" in the early stages, and would appear to give a heavier first feeding when sown in the early summer. The plants were all cut back on 21st April, 1941, and following this, the Essex plants made generally better recovery than did the Kangaroo plants and in the writer's opinion, would have provided better feed during the winter. Practically all plants, however, survived to flower during September and were worked in before setting seed. Most lines were fairly true to description and type. Of the fourteen lots sown, three were a mixture of types and one described as Dwarf Essex consisted wholly of Kangaroo plants. Plots grown from Victorian grown seed were quite as good as the imports in regard to growth and trueness to type.

B. Sown May, 1941.—Seed was sown in rows and later thinned—not transplanted. There were 26 plots, including all lots sown December, 1940, together with four special lots from the New Zealand Department of Agriculture, additional Victorian grown lines, and Kale, Chou Mollier, and White Mustard. The plants were not cut back at any stage, but were grown straight through to flowering. Sown in the late autumn the plants did not make much vegetative growth and any lines which might have had a potential capacity for heavy vegetative growth were hardly given an opportunity to express same. This comment is made with special reference to the performance of the reselected lines from the New Zealand Department of Agriculture. Flowering date observations were made and a mean flowering date calculated for each plot.

Earlier observations made on the December sown group were confirmed in this series and the New Zealand lines, possibly for lack of opportunity as suggested, did not show to outstanding advantage by comparison. The New Zealand reselected Broad Leaf Essex was placed between Victorian grown and Holland grown lines of Dwarf Essex—both good lines from which it did not markedly differ.

In the "New Zealand Reselected Giant" plot, the plants were very tall and vigorous and definitely earlier flowering than the general run of Kangaroo rape.

Mean flowering date figures indicated a fairly constant difference of a week between Essex and Kangaroo, the latter being the later flowering. An exception was provided by the New Zealand reselected giant which flowered concurrently with

Variety trials with lawn grasses.

A general view of subterranean clover plots at Burnley.

the Essex lines. A minor difference between "Essex" and "Kangaroo" is in the flower, "Kangaroo" flowers being larger and of a lighter shade of yellow than those of "Essex".

Time of Sowing Trials.

Commencing on 9th May, small sowings of Essex and Kangaroo rape were made at short intervals until 26th November, after which the ground became too hard to prepare for sowing. All sowings (of both types) up to that made on 1st August, ran up to flower. Later sowings from 20th August onwards, have not flowered up to date.

Swedes and Turnips.

Sown 27th February, 1941. 8 lots swedes, 17 lots turnips. The plants were removed in early August, when the bulbs had ceased growth and many were commencing to rot.

All swede varieties made poor growth, the best being "Elephant", but even in this variety, few bulbs exceeded 2 inches in diameter.

Of the turnip varieties, Mammoth Purple Top made the best growth, and finished with bulbs averaging a little over 4 inches in diameter. A line of this variety grown at Warrnambool, and sown a month later than the rest also made excellent growth, although finishing with rather smaller bulbs. The only other variety to make good growth was Imperial Green Globe, with bulbs averaging 3 inches. Other lots making fair growth were Early Purple Top White Globe, White Stone, and Sutton's Red Parragon. The yellow-fleshed varieties such as Yellow Aberdeen and Orange Yellow made poor growth, no bulbs exceeding 2½ inches and most considerably smaller. These latter are slow growing and might succeed better if sown earlier or in the spring.

The flat types, such as Early Milan also do better when spring sown.

Perennial Rye Grass—Subterranean Clover Mixture Trial.

A replicated yield trial was established to study the performance of the above species when sown alone, and together as a mixture. Seedings adopted as follows (quantities in pounds per acre):—

1. Perennial rye grass 15 + Subterranean clover 6.
2. Perennial rye grass 15.
3. Perennial rye grass 3 + Subterranean clover 6.
4. Perennial rye grass 3.
5. Subterranean clover 6.

Red Clover variety trials.

The plots are cut whenever the growth reaches a height of from 4 to 6 inches, and the herbage is weighed and sampled. The samples are separated into rye grass, clover and miscellaneous herbage, dried and the yield of each calculated on a dry matter basis. The trial which was sown in April, 1940, established well, but growth in the first year was severely curtailed by drought. Performance in 1941 also was rather erratic, and total yield for the year was below what would have been expected from a consideration of the total rain received for the year—31½ inches. Following a very wet January, the autumn was dry and a first cut from the plots was not taken until June. During early spring excellent growth was made, but this was cut short by the onset of dry conditions in early October and growth ceased early; a final light cut being made on 20th November. A difficulty experienced during the year was a heavy volunteer growth of cluster clover in the "rye only" plots—this contributed largely to the yield from these plots in the October cut, and the plots were subsequently hand weeded before seed had set.

Comparing yields for the two years, the pure rye grass plots show a definite reduction in the second year, while the mixture and clover plots show marked improvement. The "clover only" sowing gave the highest yield in the second year, not only of clover but of total herbage with the "light rye-mixture" fairly close in second place. A seeding of even as small an amount of 3 lb. of rye grass per acre, has definitely reduced clover growth (from 8·8 to 5·4), but has not had quite such a depressing effect as the heavier sowing of 15 lb./ac. (8·8 to 4·1). It is interesting to note that the yield of rye grass (both alone and in mixture) is practically the same for both seeding rates. In the second year, the advantage, if any, lies with the lighter rate.

Total yields for the two years are shown in Table 5 (Pounds dry matter—averages per plot).

TABLE 5.

Seeding.		Rye Grass.	Subterranean Clover.	Miscellaneous Herbage.	Total.
Rye 14, Sub. 6	1940	2·8	0·8	0·3	3·9
	1941	2·3	4·1	..	6·4
Rye 15	1940	3·4	..	0·2	3·6
	1941	2·0	..	0·4	2·4
Rye 3, Sub. 6	1940	2·2	1·6	0·6	4·4
	1941	2·5	5·4	..	7·9
Rye 3	1940	2·7	..	0·6	3·2
	1941	2·5	..	0·8	3·3
Sub. 6	1940	..	2·3	1·3	3·6
	1941	..	8·8	Trace	8·8

A trial on similar lines, but with *Phalaris tuberosa* instead of perennial rye grass was sown in 1938. This trial has shown that the growth of *Phalaris* is conspicuously better when associated with subterranean clover, and this species does not appear to compete so strongly with the clover as does perennial rye grass.

WARTIME VEGETABLE GROWING AT HOME . .

By Officers of the Horticultural Division

A BRIEF article on vegetable growing was published in the March issue of this *Journal*, and is now available as a free pamphlet. It deals with the layout of the garden and the general operations of soil preparation, manuring, planting, watering, cultivation, and rotation of crops. It also gives the main points in growing carrots, parsnips, red and silver beet, white onions, spinach, lettuce, peas, and beans, which are probably the best crops to grow at home. This second article deals with other common vegetables which require larger areas and more attention for successful production.

Cabbage of the Early Roundhead type. Note solid hearts and clean outer leaves.

The description of general operations given in the previous article is not repeated here.

One of the accompanying tables sets out suitable varieties to grow, the best time to sow them, and details of planting the seed. The other gives the number of weeks from seeding to harvest and the approximate quantity of each crop required to supply a family of five. Other details are given in the following paragraphs.

Cabbages, Cauliflowers, and Brussels Sprouts.

It is very important that the *right varieties* of cabbages, cauliflowers, and brussels sprouts be planted at the *right time*. Varieties planted out of season either produce poor hearts or run straight to seed. The seed may be sown thickly in boxes or seed-beds, and the seedlings transplanted when eight weeks old, or three or four seeds may be sown in each spot where a plant is to remain, and all but one of the seedlings removed later. This latter method enables planting at fortnightly intervals to spread the crop. Sprouts should be picked as soon as mature to keep the plants producing for the longest possible time. The side leaves should be removed as the sprouts develop.

Cauliflower hearts may be kept clean and white by tying the tips of the larger outer leaves together.

White Turnips and Swede Turnips.

White turnips are very useful, because they can be grown practically the whole year round and reach maturity very quickly. Swedes are a winter crop only. Thinnings and young leaves are a good substitute for spinach.

Radishes.

Radishes are useful for salads and garnishing. They are the quickest maturing crop which can be grown in the home garden. The seed can be sown with carrot or parsnip seed with advantage. The seedlings are vigorous, and break any crust on the soil, so allowing the more delicate carrot and parsnip seedlings to come through. They also mark the row so that inter-row cultivation may be carried out before the carrots and parsnips appear. The radishes may be left in the row until big

Mid-season type cauliflower with portion of leaves cut away to show curd.

enough for use, and the carrot or parsnip seedlings thinned when they are pulled. They can be inter-planted with lettuces also.

Pest Control on Crucifers.

Cabbages, cauliflowers, sprouts, turnips, and radishes must be protected from the small, active, green grubs of the cabbage moth and the larger, sluggish, green grubs of the cabbage white butterfly, both of which will destroy the crop if not controlled. The plants must be sprayed or dusted with arsenate of lead or dusted with a derris preparation whenever the grubs or holes in the leaves are noticed. Cabbages, cauliflowers, and sprouts so treated must be washed well before being used. Aphis also may attack these crops. Derris preparations, if available, will control aphis as well as grubs, but arsenate of lead will not. Spraying with nicotine sulphate or dusting with nico-dust will control aphis. A dust combining arsenate of lead and nicotine is available.

Slugs and snails are easily controlled with a metaldehyde bait.

Onions—Long-keeping Types.

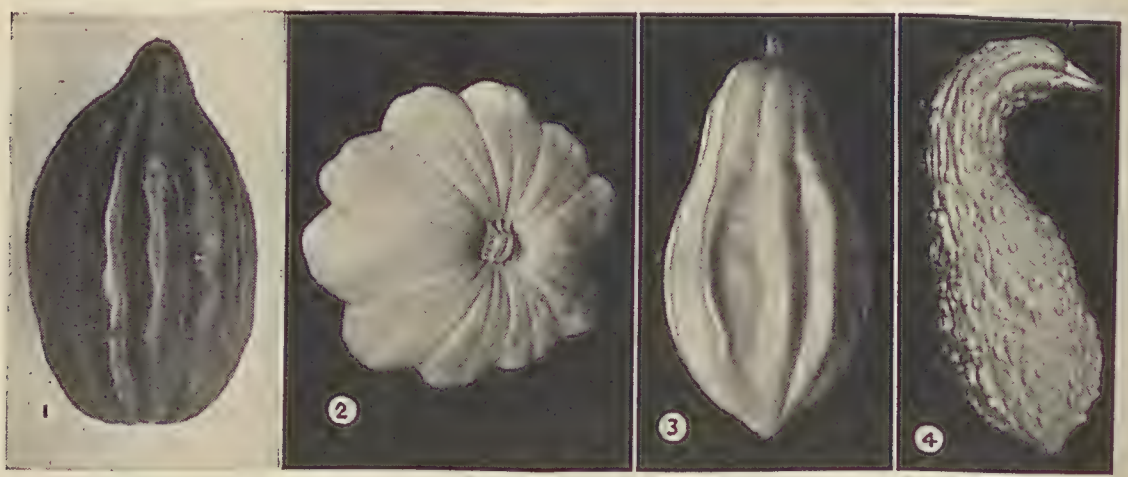
Onions of the type usually known as "Spanish Onions" are easily grown, and can be kept for many months after harvesting. The brown varieties usually store better than the white varieties. It pays to plant as large an area as possible each winter to provide bulbs for cooking.

The seed is best planted in a seed-bed, and the seedlings transplanted when 5 to 6 inches high. The roots and tops should be cut back, and the seedlings planted about an inch deep. The bulbs are mature when the tops have bent over and commenced to yellow off, The best way to store the bulbs is to tie them in bundles of six or so by the dead tops, and hang in an airy shed.

Leeks.

The leek has much in common with the onion, and is used both as a salad vegetable and for cooking.

The long white portion extending upward from the root is the most tender, and the gardener should aim at producing plants in which the blanched section is at least 6 inches long



Various types of squash.—1. Table Queen (long-keeping); 2. White Scallop (non-keeping); 3. Fordhook (long-keeping); 4. Summer Crookneck (non-keeping).

Various types of marrow.—1. Zucchini ; 2. Crookneck ; 3. Black Zucchini ; 4. Vegetable (running type).

The usual method of growing is to raise seedlings in a prepared bed and transplant when 6 to 8 inches high into a trench 4 to 5 inches deep.

As the plants grow the trench is gradually filled in, and the plants are eventually earthed up until at least 8 inches of the stems are excluded from the light.

For use as a salad vegetable leeks may be harvested immature, but for cooking are better left until well grown. Leeks cannot be stored as is the case with onions, and therefore should be harvested only as they can be used. They can be dried readily in the sun after pulling, however, and kept for later use.

Pumpkins, Squashes, Marrows, and Cucumbers.

These luxuriant, summer-growing vines are gross feeders, and respond best to a heavy dressing of well-rotted stable manure worked into the soil before planting. If stable manure is not available, about 4 oz. of blood and bone manure per square yard should be worked in. The seed is sown in groups of three or four in a shallow hollow where the plants are to remain. Two seedlings in each group are allowed to grow on.

Bush varieties of squash and marrow are best for the home garden. When runners of pumpkin and cucumber vines are 3 or 4 feet long, they should have their tips pinched out. Male flowers should *not* be removed.

Pumpkins may be stored for several months in a cool, well-ventilated shed, provided they are fully mature when cut, and that an inch or two of stalk is left attached to each one. Bruising and breaking of the rind should be avoided.

Tomatoes.

Varieties of tomatoes recommended for southern Victorian home gardens are—

Early Crop—

Burwood Wonder.—Dwarf.
Sunnybrook Earlianer.—Tie up on stakes and prune to 3 or 4 leaders.

Midseason Crop—

Red Marhio.—Tie up on stakes and prune to 4 leaders.
Tatura Dwarf Globe.—Dwarf.

Late Crop—

Mortgage Lifter, Orange Prolific } Semi-dwarf types.

It is desirable to tie even the dwarf varieties to stakes as they grow. The smooth round varieties are trained to several leaders by pruning off most of the lateral shoots.

Seedlings should be planted deeply so that the first leaf is just above the ground. Overwatering should be avoided. Fruit should be picked as soon as it turns pink, and allowed to ripen in a warm room. This will help the plants to produce bigger crops.

Spotted wilt cannot be controlled completely, but its spread can be restricted by

regular sprayings with nicotine sulphate or tartar emetic to check aphis and thrips, which carry the disease from plant to plant. Plants affected with spotted wilt, blue-top, or rapid dying of the lower leaves, should be pulled up and burnt.

Potatoes.

The potato crop is frost-sensitive, and in most Victorian localities tubers should not be planted before early spring.

Potatoes like an acid soil, and are good soil-sweeteners. If they are grown in a soil which has been heavily limed, they are likely to become scabby. Small whole potatoes are best for "seed." As the shoots grow, the soil should be mounded up around them. The crop is ready to dig when the tops begin to die down. The tubers may be stored by burying them deeply in a straw-lined pit in well-drained soil, or in a cool, dark cellar.

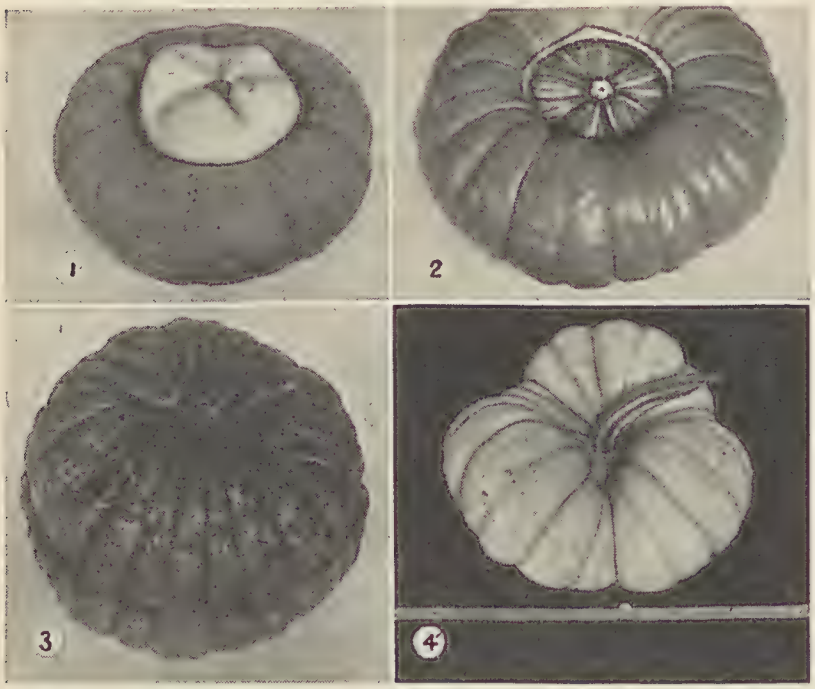
Celery.

Celery should be "blanched," that is, the stalks must be made to grow white or cream instead of the natural green colour unless it is required for cooking only. This can be done by planting the seedlings in a trench, and gradually filling the soil in as they grow, keeping it just below the leaves. It can be done also by planting the seedlings at ground level, and fixing boards close in to each side of the row as the plants grow. Other methods consist of wrapping several layers of newspaper around each individual plant, or placing earthenware pipes of about 4 inches diameter over each plant about three weeks before plants are large enough for use. The plants must be protected from celery rust by spraying with lime sulphur, half a cupful in a gallon of water, at monthly intervals.

Rhubarb.

Rhubarb is a perennial, and the roots must be planted where they can remain indefinitely. Roots should be planted out in June, preferably in soil where animal manure has not been applied for a year or two, and care should be taken not to cover the buds with soil. When the plants begin to grow, they may be mulched with animal manure, or dressed with market-garden manure. Roots may be lifted and divided in the third year.

Most varieties do not produce stalks all the year round. A selection of varieties can be made, however, which will ensure that rhubarb is always available. (See planting table.)



1.—Turks Cap (high crown). 2.—Turks Cap (low crown). 3.—Queensland Blue (Beaudesert) pumpkin. 4.—Triamble pumpkin.

Asparagus.

Asparagus is a perennial. The soil should be trenched deeply and enriched with well-rotted animal manure before planting. The bed is best planted with two-year-old crowns. No shoots should be picked during the first season, and cutting should cease at the end of October in the second season. When the foliage begins to turn brown in autumn, cut it down, and give the bed a shallow forking. A heavy dressing of animal or blood and bone manure should then be applied. When the shoots come through in spring, they should be cut about 6 to 8 inches below the surface as soon as the tip can be seen. Daily cutting is necessary. After mid-December,

no more shoots should be cut until the foliage is removed in the autumn. The application of salt to asparagus beds is unnecessary.

Jerusalem Artichoke.

Jerusalem Artichoke is a tall, sunflower-like plant producing quantities of knobby tubers which make a good alternative to potatoes in the diet. It is treated much as potatoes are —small smooth tubers are saved for "seed," planted during the late winter, and manured and watered well. It is ready to harvest when flowering is over. It is particularly free of pests and very easy to grow. A dozen plants will supply a family of five. They are best planted in an out-of-the-way corner.

Sweet Corn.

Sweet corn is an attractive plant, and the cobs are a tasty and valuable food. The cobs are ready to pick when the silks (tassels) have withered and the cobs feel plump. The white types produce an average of two cobs, and the yellow types an average of one cob per plant.

Garlic.

Garlic thrives in soil conditions similar to those required by the onion crop.

The crop is propagated by planting the small "cloves" during late autumn. The plants die down about eight to ten months after establishment of the cloves, and the bulbs are lifted when the tops have dried off. Bulbs should be allowed to cure in the open for several days and then transferred to a well-ventilated shed or other convenient position under cover for storage.

Watermelons, Citron (Jam) Melons.

Watermelons and citron melons are grown like pumpkins. They require heavy feeding and watering, and the tips of the runners must be pinched out when 3 or 4 feet long. The quality of watermelons grown in southern Victoria is only fair.

The following table gives the time taken for each crop to reach maturity, the period over which it may be used, and the approximate quantity required at each planting to supply a family of five.

Crop.	Time from Planting to Maturity.	Period of Usage in Fresh State.	Storage.	Quantity per Planting for Family of Five.
	Weeks.			
Cabbages	16–20	14th–21st week	2 weeks	18 plants
Cauliflowers	16–20	16th–21st week	2 weeks	18 plants
Brussels Sprouts	16	May to Sept.	2 weeks	12 plants
White Turnips	12–13	10th–14th week	4 weeks	30 ft. of row
Swede Turnips	16	14th–18th week	8 weeks	30 ft. of row
Radishes	6–8	6th–8th week		6 ft. of row
Onions—				
Brown Spanish	32	25th–32nd week	20 weeks	72 ft. of row
White Spanish	32	25th–32nd week	20 weeks	72 ft. of row
Aust. Brown	32	25th–32nd week	30 weeks	72 ft. of row
Leek	35	25th–35th week	Dried	30 ft.
Pumpkins	14–17	12th–20th week	5 months	6 groups
Squashes	14–17	12th–20th week	3 months	6 groups
Marrows	14–17	12th–20th week	2 months	6 groups
Tomatoes	16	16th–25th week	In bottles	12 plants
Potatoes	21	Jan.–May	4 months	70 plants
Jerusalem Artichoke	40	May–July	3 months*	12 plants
Celery	20	16th–24th week		12 plants
Sweet Corn	12–16	12th–16th week		12 plants
Garlic	34		Dried	12 plants
Rhubarb	60	Wilson's Ruby—Sept.–Mar. Topp's Winter—Mar.–Aug.	In bottles	6 plants
Asparagus	65	Sept.–Dec.	In bottles	40 plants

* Store in dry sand or sawdust.

PLANTING TABLE FOR HOME GARDENERS IN SOUTHERN VICTORIA

Crop. / Variety.	Best Time to Sow.	Method of Sowing.	Depth of Sowing.	Distance between Seeds.	Time to Thin Out or Transplant.	Distance between Rows.	Distance between Plants.
				ft. in.		ft. in.	ft. in.
Cabbages—							
St. John's Day	Sept.	Seed bed *or* 3 or 4 seeds in situ	¼ to ½ in.	..	Late Nov. / Jan. / Mar. / July	2 6	2 0
Succession	Oct.						
East Ham	Late Jan.						
Parisian	May–June						
Cauliflowers—							
Green Leaf	Dec.	„	¼ to ½ in.	..	Feb. / Mar.	2 6	2 0
Phenomenal	Jan.						
Brussels Sprouts—							
Fillbasket	Nov.–Dec.	„	¼ to ½ in.	..	Jan.–Feb.	2 6	2 0
White Turnips—							
White Stone	Aug.–Mar.	In drills	¼ to ½ in.	0 1	3 in. high	1 0	0 4
White Egg							
Swede Turnips—							
Laing's Garden	Jan.–Feb. and July–Aug.	„	¼ to ½ in.	0 1	3 in. high	1 6	0 6
Champion Purple Top							
Radishes	All year	In drills	½ in.	0 1	..	0 9	0 1
Onions—							
Brown Spanish	Apr.–May	Seed bed	½ in.	..	5–6 in. high	0 9	0 3
Aust. Brown							
White Spanish							
Leek	March–Apr.	„	½ in.	..	6–8 in. high	0 15	0 5–6
Pumpkins—							
Turkscap	Sept. to Dec.	In groups of 3 or 4	1 to 2 in.	6 0	3 in. high	6 0	..
Triamble							
Squashes—							
Table Queen	Sept. to Dec.	„	1 to 2 in.	3 0	3 in. high	4 0	..
Green Hubbard							
Marrows—							
White Bush	Sept. to Dec.	„	1 to 2 in.	3 0	3 in. high	3 0	..
Green Bush							
Cucumbers—							
Long Green Prickly	Sept. to Dec.	„	1 to 2 in.	3 0	3 in. high	4 0	..
Crystal Apple							
Water melons	Sept. to Dec.	„	1 to 2 in.	6 0	3 in. high	8 0	..
Citron melons							
Tomatoes (see text)—							
Early	Aug.–Sept.	Seed bed	¼ in.	..	Oct. / Nov. / Dec.	Staked 2 0 / Unstaked 3 0	1 0 / 2 0
Midseason	Sept.						
Late	Oct.						
Potatoes—							
No. 3 Carman	Oct. to Dec.	Deep furrows	5 in.	..	..	2 6	1 3
Up-to-date							
Jerusalem Artichoke	July to Aug.	Deep furrows	5 in.	..	..	3 0	1 3
Celery—							
Golden Plume	Jan. to Feb.	Seed bed	¼ in.	..	5 in. high	2 0	0 8
Sweet Corn—							
Country Gentleman	Oct. to Nov.	Drill or dibble	1 in.	0 6	..	2 6	0 6
Golden Bantam							
Garlic	Apr. to May	Rows	1 to 2 in.	..	..	1 0	0 4
Rhubarb—							
Wilson's Ruby	Crowns in May to Aug.	..	..	..	..	3 0	2 0
Topp's Winter							
Asparagus—							
Mary Washington	Crowns in June to Aug.	..	..	..	..	4 0	1 6
Connover's Colossal							

Fodder Conservation

Report of the Judge—G. B. RAYNER, B.Agr.Sc.,
Assistant Agrostologist

MAFFRA DISTRICT COMPETITION

Glenmaggie Weir supplies the Maffra-Sale Irrigation System.

IN December, 1941, the Royal Agricultural Society of Victoria announced that as a result of financial support from the Victorian Government and the Commonwealth Fodder Conservation Board, it was able to extend an open invitation to primary producers' organizations to participate in a subsidized fodder conservation competition. The Maffra and District Agricultural Society, which always has assisted in any movement designed to foster local interest in better farming methods, accepted this invitation, and received twelve good entries for the competition.

The Maffra district enjoys conditions ideally suited to the growing of perennial pastures under irrigation. The loamy character of the soil facilitates grading and the establishment of a good seed-bed; the absence of the extreme heat encountered in the northern irrigation areas makes it relatively easy to maintain the pasture during the summer months; and the dependability of the water supply is second to none in the State. If reliable seed is sown, and reasonable attention is paid to the care and management of the pasture, luxuriant growth can be expected for eight months of the year. In addition, there is very little of this country incapable of growing excellent crops of lucerne, in many instances without irrigation. With the application of the best principles of irrigated pasture culture, it is considered that the district as a whole should be capable of carrying almost a cow to the acre. This, in fact, has been achieved by some of the entrants in the competition.

In view of the above-mentioned circumstances, a great deal of attention by local farmers to fodder conservation would not be anticipated; and it is not surprising that the quantity of fodder conserved fell far below the standard required for maximum marks in the competition. The general practice in those parts of the district which have had irrigation for some years, appears to be the sowing down of about 10 per cent. of the area to lucerne, and using this as practically the sole source of supplementary fodder. This means that on a farm carrying about three-quarters of a cow

A well-protected stack.

to one cow per acre, there would be about ¾ ton of lucerne hay stored per cow. This has been found sufficient for one year, and normally very little hay is carried over.

It would appear, therefore, that fodder conservation in Maffra means the storing of sufficient fodder to supplement pasture growth for one winter (in very few instances is hay fed all the year round); and little thought is given to laying by a reserve supply for an unexpected period of low production. It has been pointed out that under normal conditions such a period is not likely to occur in this district. Nevertheless, it is always a possibility. For example, should the rationing of superphosphate become more severe and prolonged, with a consequent reduction in pasture yield, the farmer who has an extra reserve of fodder will be in a happier position than his neighbour with no such reserve. The conservation of excess spring growth as pasture hay has been neglected in most instances; and the possibility of pasture silage as a long-term fodder reserve, appears to have been entirely overlooked.

The quality of the fodder exhibited generally was high. In some instances, rain had delayed cutting, or had fallen before the lucerne could be carted, with a consequent reduction in the value of the hay. Nevertheless, all the competitors had an appreciation of the factors necessary for the production of first-class fodder, and where the weather conditions had been favorable, some exceptionally high-quality hay had been conserved.

The growing of annual fodder crops in quantity was not favoured by the majority of competitors. They consider, with justification, that this land can be utilized best by sowing down to permanent pasture and lucerne. In order to obtain a proper appreciation of these annual crops, it must be realized that, under Maffra conditions, a permanent pasture will produce between 20 and 30 tons of highly nutritious green fodder in one year. However, some of the entrants had a small area of maize, saccaline, or imphee, which will provide a useful addition to their fodder reserves, and points were awarded accordingly. These remarks regarding the growing of annual crops do not apply to two of the competitors who have had the facilities for irrigation for three years only, and therefore are still cropping a fair proportion of their farms. They are rapidly sowing their land to permanent pastures, and soon will be in the same category as the irrigators of longer standing. It may be said that the young pastures on the properties of these two competitors—Messrs. Craig and Lambecht—were among the best seen on this tour of inspection.

In allotting points for the location of the fodder reserves, consideration was given to the possibility of fire or flood, and to the economy of feeding and general accessibility. Only two stacks were built in situations liable to flooding, although the risk here was not very great;

Illustrating two methods of fodder conservation—stack and pit silage.

and no stack was considered to be in a location involving fire risk. Some stores were more accessible, and afforded an opportunity for greater economy of feeding than others; and marks were awarded accordingly.

Due regard was paid to the protection of the fodder from stock; while protection from fire and pests did not require much attention, because in an irrigation district fire risk is at a minimum, and vermin do not normally attack lucerne hay. However, there was no uniformity in the protection afforded from the weather. Two of the competitors had all their hay in a shed, and three others had part of their fodder under cover, but the remainder had made no attempt to guard against damage by rain. If a stack is not covered, there is bound to be some deterioration of the outside layer of hay. The extent of this deterioration will depend on the construction of the stack, and the relation of the surface area to the volume contained.

Well-built stacks. Protection is afforded by good fences and thatching.

The Awards.

The winning entry was submitted by Mr. E. J. Pearce, of Boisdale. Mr. Pearce was the only competitor who had fodder reserves in excess of requirements for one year. Although this gave him a commanding lead over the other competitors, it will be noted also that it was not only for quantity that Mr. Pearce scored high marks. His hay—mostly lucerne and a little pasture hay—was all stored in an excellent shed, from which trollies on rails are run along behind the bails in the milking shed. Both sheds were fitted with electric light, an added convenience in the winter when milking is carried out in the dark. Mr. Pearce has been a liberal user of superphosphate; his usual dressing for pasture has been 2 to 3 cwt. per acre, and for lucerne 4 cwt. per acre each year. Now that enemy action has cut off the normal supply of this manure, the fertility which Mr. Pearce has built up by generous top-dressing, together with his extra reserve of hay, will stand him in good stead.

Mr. T. Harvey obtained second place with an attractive exhibit of excellent quality lucerne hay, and a little oaten hay, housed in a well-built shed. A feature of this shed was the overhanging roof which projected a couple of feet beyond the hay, allowing the water to run off, clear of the hay, and obviating the need for spoutings and downpipes. The hay is chaffed and fed in the bail all the year round at the rate of two buckets of lucerne chaff, or one bucket of oaten chaff, plus one bucket of chaffed maize, at each feed. Mr. Harvey has subdivided his pasture into twenty paddocks which are grazed in rotation by the dairy herd for two days each, with

Raking meadow silage.

the result that the sward is never punished and the pasture is allowed a good recuperation period between grazings. The fact that, at the time of inspection, Mr. Harvey was carrying 35 cows in milk, 6 dry cows, 20 eighteen-month-old heifers, 16 yearlings, 9 calves, 5 bulls, and 5 horses on his 81-acre farm (of which 66 acres is pasture), and had sold 26 head of stock since the previous November, is a tribute to his grazing management. It was on this farm that the best crop of saccaline inspected in the district was exhibited.

Mr. W. J. Craig, who gained third place, is a newcomer to irrigation. His crops were the most diversified of any of the competitors, consisting of sugar beet, oats, millet, and a little maize, in addition to lucerne and pasture. The fodder exhibited consisted of baled lucerne hay and oaten hay. Both were of high quality, and were well stacked and protected.

Details of the awards are given in the accompanying table:—

MAFFRA AND DISTRICT FODDER CONSERVATION COMPETITION, 1942. DETAILS OF THE AWARDS.

Place.	Competitor.	Quantity and Quality of Fodder. (Based on potential carrying and amount of prime fodder conserved).	Green Crops and Uncut Lucerne.	Fodder in Excess (Awarded pro rata).	Suitability of Fodder.	Condition of Stock.	Location (*re* fire, flood, economy of feeding, and accessibility).	Protection from Weather, Pests, Fire, Stock, &c.	Total.
—	Maximum points	80	10	60	15	10	10	15	200
1	E. J. Pearce..	80	2	18	15	10	10	15	150
2	T. Harvey ..	59	10	..	15	10	10	15	119
3	W. J. Craig ..	68	3	..	15	10	9	10	115
4	W. Amey ..	60	1	..	15	10	10	13	109
5	S. Lees ..	64	5	..	15	10	9	4	107
6	C. Lambecht ..	60	6	..	15	10	8	4	103
7	J. C. Higgins..	56	1	..	15	10	10	10	102
8	R. Gutheridge	63	1	..	15	10	7	5	101
= 9	H. J. Hallowes	39	5	..	15	10	7	4	80
= 9	S. S. Moulton, No. 1 ..	32	10	..	15	10	8	5	80
11	C. Tucker ..	26	..	..	15	10	10	7	68
12	S. S. Moulton, No. 2 ..	20	..	..	15	10	10	6	61

Drainage of Pigsties

When drawing up a plan for the erection of new pig-sties one of the most important things to bear in mind is that they must be properly drained. This does not mean merely that surplus moisture must be carried out of the sty without regard to where it runs. One of the most common faults in draining a line of sties is to run a continuous drain through them so that the drainage from the top sty runs through the next and so on down the line. In case of an outbreak of contagious disease in a sty at the upper end of the line the germs will be carried to all the other pens. The infection will then be picked up by the pigs on their feet and thence carried to the feeding troughs. This is one of the ways by which disease is most commonly spread among pigs. The obvious way to avoid this risk and also to obtain more effective drainage is to run the drain from each sty into a common drain situated outside, and in front of, the line of sties. The floor of the sty should slope from back to front so that the pigs' sleeping-quarters are kept dry and the drain is easily swept down and kept clean. The outside drain can be disinfected without risk of poisoning the pigs.

Black Disease of Sheep

By W. D. SHEW, G.M.V.C., B.V.Sc., Senior Veterinary Officer

BLACK disease of sheep (*Infectious Necrotic Hepatitis*) has been known to exist in the south-eastern portion of New South Wales, in Victoria, and in Tasmania for many years, and from time to time it has engaged the attention of various eminent scientists, amongst whom one might mention the late Dr. Dodd, of the Sydney University Veterinary School, the late Dr. Gilruth, and more recently Dr. H. E. Albiston, of the Melbourne University Veterinary Research Institute, and Dr. A. W. Turner, of the Council for Scientific and Industrial Research. For many years sheep owners in Victoria and Tasmania called this disease "Braxy" or "Braxy-like" disease, but the use of that name has been discontinued, and the name Black disease, which was in common use in New South Wales, has been adopted in preference.

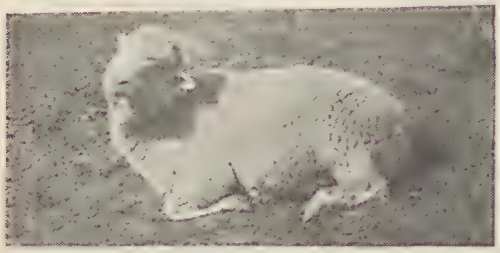
Braxy, a fatal contagious disease of sheep in Scotland and certain European countries, does not exist in Australia, and the use of the term may lead to confusion in oversea countries, and do some damage to the sheep-breeding industry in Australia.

Black disease affects sheep of all sexes and all ages from weaners onwards; so far it has not been observed in lambs. It is caused by the *Bacillus Oedematiens*, which will grow and multiply only in dead tissue. That fact explains why the disease is associated with the invasion

A sheep that had previously shown no signs of illness is seen lagging behind the flock.
[*C.S.I.R. photo.*

of the liver by the liver fluke. When the immature fluke enters the liver through its capsule and bores its way to a bile duct, it leaves behind it a track of dead tissue which provides an ideal site for the growth of this bacillus and

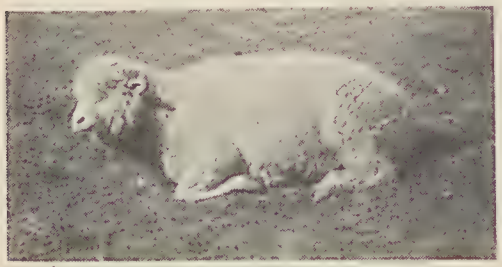
the elaboration of its special poison. Thus the disease occurs mostly in the summer and autumn when the young fluke is most active. It is most prevalent between the months of December and June, being at its worst usually in February, March, and April, and, although the incidence steadily decreases up to June, deaths may occur at any time during the year.



An affected sheep. This animal exhibited symptoms of pain, and frequently flexed the head round to the left side.

[*C.S.I.R. photo.*

Affected animals are almost invariably in quite good condition, and death occurs suddenly and without a struggle. As a rule, the body is found lying on its brisket with the legs tucked under as though the animal had died in its sleep. One very rarely sees a sheep sick with this disease; usually a few are found dead on the camp in the morning, while the remainder of the flock appear quite healthy and in good condition. Occasionally, however, if an affected flock be driven with a dog, one or more sheep will be seen to lag behind as though unable to keep up with the mob. If one of these sick sheep is forced along it will lie down on its brisket with its legs tucked under it and its head stretched out as though it is out of breath. Within a short time, varying from a few minutes to an hour, the animal will die without a struggle.



A sheep ill with black disease. Note the extended head and dilated nostrils.

[*C.S.I.R. photo.*

After death the carcass turns black and decomposition sets in very rapidly; therefore, a post-mortem examination, to be of any value, must be made almost immediately. This is particularly necessary if specimens are to be forwarded to a laboratory for examination. The organs of a sheep which has been dead for more than an hour will have reached such a stage of putrefaction that it becomes extremely difficult even for the scientist with all his laboratory facilities to be sure of the presence or absence of Black disease.

On post-mortem examination a pale or reddish jelly-like material frequently is found under the skin, especially near the brisket. When the body cavity is opened up we find in it a cupful or more of clear or blood-stained fluid, the colour depending on how long the animal has been dead. The liver will be found to be dark red and full of blood. On careful examination of the surface of the liver, we find one or more light-coloured patches. These vary in size from one-half to 2 inches in diameter; they are irregular in shape and their edges are very clearly defined, being surrounded by a thin, dark-red line. On being cut these patches are found to extend into the liver substance for some depth. On very careful search one can sometimes find an immature fluke in the light-coloured substance.

A sheep dead from black disease. There are no signs of struggling.

[*C.S.I.R. photo.*

A small quantity of fluid, similar in all respects to that found in the body cavity, is frequently found in the chest cavity. The most important lesion in the chest, however, is a small bag of jelly-like material surrounding the heart. This is enclosed in the pericardial sac—that thin layer of tissue in which the heart is enveloped—and varies in quantity from two to four fluid ounces.

Farmers who are losing sheep under the conditions just described should secure a specimen from a freshly-dead sheep and forward it for examination, so that a correct diagnosis may be made. The whole of the internal organs, including the heart and lungs, should be placed in a kerosene or petrol tin and covered with a weak solution of formalin (one cupful to

two gallons of water). If the bowels are too voluminous to be placed in a tin, the rumen or paunch may be discarded. All cut ends should be tied securely to prevent leaking of food material and consequent discoloration of the specimen. The tin should be soldered down and forwarded by rail to Spencer-street or Flinders-street railway station, clearly addressed to the Veterinary Research Institute, Story-street, Parkville. When it is not possible to send all organs the liver only should be placed in a half-petrol tin covered with a weak solution of formalin and forwarded. The Director of the Research Institute always should be advised by telegraph or telephone (F 2141) of the despatch of specimens, the symptoms shown by the animal and the disease suspected. At the laboratory the organs are examined for the presence of the germ which causes the disease or in its absence for evidence of any other disease which may be the cause of death.

Although Black disease exists only on "flukey" pastures, owners must realize that deaths from other causes may be occurring at the same time. For example, it has been found that vaccinated sheep have died and the owner may be inclined to blame the efficacy of the vaccine, whereas it is often found in such cases that deaths may be taking place from acute fluke invasion or heavy worm infestation, against which Black disease vaccine would be useless as a preventative.

If sheep are seen sick for several days or are in poor condition, some other disease or starvation must be suspected. Sheep which die of Black disease are almost invariably in good condition, and they die quite suddenly.

The skin quickly becomes black, and the wool pulls out easily.
[*C.S.I.R. photo.*

The organism which causes Black disease was first isolated in pure culture by Dr. Albiston. It was carefully and extensively studied by Dr. Turner and, as a result, a vaccine protecting sheep against the disease was developed. Recent research work at the Commonwealth Serum Laboratories has resulted in the production of a new type of vaccine which is administered in a single dose. The manufacture of this vaccine is based largely on the method originated by Dr. Turner.

Skin from the carcass of a black-disease sheep, showing the black colour.
[*C.S.I.R. photo.*

Although the old vaccine gave excellent field results for several years, it has been superseded by a single dose of vaccine which stimulates an active immunity many times as great as that stimulated by the usual two doses of the former and, further, this immunity is sustained over a longer period. It is claimed that a very high degree of immunity is reached 14 days after injection, the maximum being reached in 21 days. In addition it has been found possible to reduce the volume of the injections from two doses of 5 c.c. each to one dose only of 2 c.c., an obvious saving of time and labour to stock owners.

The new Black disease vaccine is obtainable from the Commonwealth Serum Laboratories, Parkville, N.2, Victoria. The vaccine is available in the following quantities:—

	s.	*d.*
50 c.c. sufficient to treat 25 sheep	2	6
100 c.c. sufficient to treat 50 sheep	4	0
250 c.c. sufficient to treat 125 sheep	7	3
500 c.c. sufficient to treat 250 sheep	13	6
1,000 c.c. sufficient to treat 500 sheep	26	0

Full directions will be found on the labels. Once a bottle is opened it should be used immediately, but unopened containers keep quite well in a cool dark place.

Cattle also die from Black disease, and may be treated in a similar fashion to sheep, the dose being 10 c.c.

Since the liver must be injured by the young liver fluke before the germ can attack it, several avenues of prevention are open, and may be adopted either separately or conjointly. (For methods of control see liver fluke pamphlet—obtainable free from this Department.)

As carbon tetrachloride is essential for treatment of sheep against the liver fluke and supplies are strictly limited, it is essential that a definite diagnosis of the presence of liver fluke should be made to save possibly unnecessary use of such a valuable drug.

It must be realized also that even on very "flukey" country it is usually not necessary to drench more than three times a year. In fact on most "flukey" country a single drench about the middle of June will prevent trouble from chronic fluke disease, and this together with other control measures such as the proper use of bluestone, drainage, &c., as outlined in the pamphlet on liver fluke should do much to prevent serious losses.

Vaccination does not kill the germ which causes Black disease. A sheep whether vaccinated or not may carry the germ in its liver, and may remain in apparently quite good health just so long as it is not attacked by the fluke. If the carcass of such a sheep is allowed to rot on the ground after death from any cause whatever, the germs will be spread on the pasture, and may thus gain entry to the livers of other sheep grazing over the same ground. For that reason it is advisable to destroy the carcasses of all dead sheep, and thus prevent the spread of this and many other diseases.

This precaution applies particularly to properties on which Black disease is known to exist. If it is not always possible to burn the carcass, a burial ground should be set apart and stock kept away from it at all times.

The following programme might be followed by sheep owners with advantage:—

April (end).—Drenching.
June (middle).—Drenching.
June (end).—Bluestoning pastures.
July (end).—Drenching.
November.—Vaccination.
December (end).—Bluestoning pastures.

Stock owners should realize also that cattle as well as sheep can contract Black disease; therefore, stocking "flukey" paddocks with cattle instead of sheep offers no solution to the problem of fluke and Black disease eradication.

A pamphlet dealing with the vaccination of sheep, giving the methods to be adopted and the precautions to be observed, is obtainable free on application to the Director, Department of Agriculture, Melbourne, C.2.

Accredited Brucellosis-free Herds (Swine).

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector) of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen	Horn, L. A.	Leongatha North
Bowran, L. G.	"Glendare," Tallangatta	Longerenong College ..	Dooen
Bright, George H. ..	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Castle, L. H.	Clarinda	Pietsch R. E.	Katyil
Critten, H. S.	Dumbalk	Rintoul, J. T. C. ..	Glengarry
Dookie Agricultural College	Dookie	Roy, W. A.	Morrell's Hill, via Boolarra
Doornbusch, John L. ..	"Starpark," Nhill	Spiers, Albert	Bamawm Extension
Fairchild and Clutterbuck	Tinamba	State Experiment Farm	Rutherglen
Geddes, L. D. ..	Bungaree	Sutherland, R. N. ..	Nullawill
Harrison, C. T. ..	"Eastside" Stud, Pomborneit	Trenery and Soderlund	"Promview", Foster
		Trigg, A. J.	Bungaree
		Trigg, N. H.	Bullarook
Hawtin, I. E. & F. ..	"Rossmoyne," Colac.	Tweddle, J. T. ..	"Winlaton," Shepparton
Haywood, Dr. A. R. ..	Hastings	Walch, M. U.	Baring

Fodder Conservation Competition

Swan Hill District

Report of the Judge A. MORGAN, B.Agr.Sc., Irrigation Field Officer

Dairy Shorthorns on the Swan Hill river flats.

THE Swan Hill District Fodder Conservation Competition was conducted by the Swan Hill Agricultural Society in conjunction with the Royal Agricultural Society.

The district has long been noted for the productivity of its irrigated lucerne paddocks, particularly on the Murraydale flats. In recent years this crop has been extended in area, and is showing to equal advantage on other areas of heavy black land.

Some paspalum paddocks, originally lucerne stands, which have been regularly top-dressed with a bag or more of superphosphate to the acre, have developed a high perennial clover content—in some cases white clover similar to the Dingee strain is predominant, in others a vigorous type of strawberry clover, usually referred to as the Swan Hill strain, is conspicuous.

A noteworthy feature on the best of the black land is that lucerne is long-lived, and, in addition, can be re-planted successfully. This has not been the case in other irrigation districts, and has a considerable bearing on the continued popularity of lucerne at Swan Hill, whereas in other settlements lucerne has been slowly but surely replaced by pastures in which perennial clovers and perennial grasses are the most important elements. This continued popularity of lucerne, which can be maintained with less frequent irrigation than is needed for pasture, is reflected in the fodder reserves exhibited this year. One exhibitor was outside the irrigation district, and another was a dry farmer carrying on an irrigation property as a subsidiary—these competitors entered stacks of cereal hay, but otherwise oaten hay was a minor element in the stackyards, and had been bought in to mix with lucerne hay. The quality of the lucerne exhibited was uniformly good in regard to curing, and stacks generally were well built, but some stacks of first-cut hay were very dirty with thistles and other rubbish, more suitable for ensiling than for hay-making.

No samples of pressed hay were seen. One exhibitor remarked that in this form the hay

is too lumpy for feeding-out; however, it is probable that baling is less useful on the small property under intensive cultivation than it is on broad acres, where ease of transport assumes greater importance in farm economy. As very little lucerne hay left over from the previous year was seen, it appears that the accumulation of temporary reserves is the main consideration. For permanent reserves pressing would offer advantages in storage and protection from the weather—a factor which was not given a great deal of attention by exhibitors. Reserves accumulated each summer on these properties appear to be used up by the following summer, and if any surplus remains it usually is sold. The rate of stocking on these farms, which, for the most part are dairying propositions, usually is subject to very little variation, except the steady increase due to improved methods or the bringing of difficult patches of ground into permanent crops, and the rainfall has very little to do with annual production from well laid out lands under irrigation. Fodder requirements for the lean periods consequently are predicted with accuracy, and the required tonnage is accumulated each summer.

Small high-producing properties, such as can be developed under irrigation by attention to details of subdivision, lay-out for irrigation, regular top-dressing, rotational grazing, &c., do not present any great problems in connexion with economy of production of fodder reserves. Each acre is utilized, compactness of the farm enables centralization of all activities, and once the farm is laid down with permanent crops its maintenance, apart from improvements to stock and plant, becomes almost a matter of routine. Watering has to be more carefully attended to, and this work alone absorbs relatively more of the irrigators' time and energy than on large properties. Drainage problems assume more importance as the land holder develops a greater sense of responsibility in regard to the misuse of irrigation water—frequently it is only by installing pumps to lift excess water back into supply channels or water-ways that disaster is averted when heavy rains follow soon after irrigation. Several such pumps were noted during the inspection.

During the judging of fodder conservation competitions the collection of information and the inspection of stock, fodder reserves, and paddock growth leave very little time for discussion with competitors of problems of accumulating and preserving fodders under local conditions. Exhibitors often ask for what purpose the competitions are organized. The question is a very pertinent one, since those who would benefit most from improvement in their methods of conservation seldom enter the competitions. But if the accomplishments of the more progressive element recorded in the reports of these competitions encourage others to try to emulate their example some good will have been achieved.

In all irrigation districts the fodder conservation potential is governed to a great extent by the amount of phosphate applied to the soil. Consequently the present shortage of superphosphate is the worst blow yet suffered by the owners of small blocks. At one time the Swan Hill irrigators insisted that the fertile soil of the flats was sufficient in itself, and that the use of superphosphate would be a waste of money. However, experiments conducted by the Department of Agriculture on the property of Mr. S. Masters showed very quickly and plainly that this opinion was far from correct, and that, on the contrary, the use of fertilizer on their fertile soil paid much better dividends than it did in other irrigation districts. Since that time the practice of regular top-dressing has spread, and the rate of application has increased steadily. Concurrently, the timing of waterings has improved greatly, and the outlook in regard to watering has changed, so that lucerne and pastures are saved from periodical spells of moisture deficiency. The results achieved by the improved methods are not temporary, as is shown by the fact that one paddock in the district, now carrying a heavy sole of perennial clovers and *Paspalum dilatatum*, and regarded as the best paddock on a particular farm, has not been cultivated for the last 25 years.

Dairy stock from the district, especially from a few farms whose owners have devoted their time and skill to breeding, are well known for their production figures. Without good feed and stored fodders to keep them in good condition right throughout the year, results would be erratic and discontinuous.

Alkali, which has been the bane of irrigation activities the world over, has not been responsible for any outstanding damage to the soil in the irrigated areas of the district, although certain areas locally known as "soda land" show that the conditions associated with damage to the soil by excessive mineral concentrations at or near the surface are present to a minor extent. One area noticed was definitely "salty," and as it has never been

Lucerne plots at Swan Hill.

Left—Manured with superphosphate. Right—Unmanured.

watered its presence could be explained only by assuming seepage from adjoining irrigated lands. This patch was not seen at Murraydale, but on similar land in another section.

The visible signs of prosperity in the settlement—fat stock, plenty of paddock growth of superior plants, neat gardens and other farm surroundings—all can be directly attributed to the successful combination of grading, water, and superphosphate with lucerne. The successes obtained with lucerne, however, have blinded many land-holders to some extent to the even greater possibilities offered by permanent pasture culture. A bias against pasture is so evident in some quarters that ridiculous comparisons are often made. For example, on the occasion of a tour of Dookie Agricultural College students through the district, one irrigator gave it as his opinion that "poor lucerne was better than good pasture." Without labouring the point, it can be stated definitely that this opinion is contrary to facts, although it is granted that it may be more convenient to neglect the watering of lucerne on occasion, a practice which is not conducive to good results with permanent pastures. Time will show, in the Swan Hill district as surely as it has in other settlements, that permanent pasture represents the climax of achievement in any irrigated culture involving the production of animal material. Experimental plots established at Mr. A. Douglas's have shown that a mixed pasture of rye grass, cocksfoot, and clovers can be established and kept at a high level of production on the typical soil of the Murraydale area, and it is significant also that through Tyntynder and elsewhere, where conditions are not as favorable to continued lucerne growth, the proportion of land devoted to pasture shows a steady increase. There is no necessity for alarm in regard to the effect that the replacement of lucerne by grasses and clovers will have on the capacity of the farm to provide fodder reserves. Grass hay cut from pastures of this type, given equal conditions for curing, &c., is palatable and nutritious, and represents no more trouble in handling, although some heavy clover growths may give a little trouble during mowing.

"Super." renovated the degenerate lucerne and the benefits were sustained over many years.

The manured plots gave treble the yield of the untreated plots.

Bloat is a factor of some importance where lucerne is the main pasturage. With a proportion of perennial rye grass in the grazings, as long as paddocks are given reasonable periods of rest between grazings, the risks of bloat are greatly reduced, and with a well-balanced mixed pasture they are practically eliminated. Some hand-feeding carried on throughout the year, and adoption of the practice never to allow stock to go into a fresh paddock in a hungry condition, will greatly reduce the danger of cattle "blowing."

On some of the larger properties sheep are being run on intensive lines. The disease problem with sheep on irrigation is more serious than with cows, although veterinary research in recent years has evolved successful treatments for several important diseases. It is considerably harder to build up good pastures where sheep are carried than with cattle, unless a rotational grazing system which reduces over-grazing of clover species is carefully followed.

The Awards.

First place in the competition was gained by Mr. C. O. Jennings. His exhibit consisted of eight stacks of lucerne hay and a stack of oaten hay. Information concerning this property, and the methods employed on it, is rather meagre, as Mr. Jennings was not present at the time of the judging. Any errors in the following description therefore must be attributed to the fact that it has been compiled from information garnered from outside sources. The property, which is one of several owned by Mr. Jennings, is 200 acres in area, with an annual water-right of 150 acre-feet. It is situated in what appears to be a dry lake, and includes the usual sand hill to the eastern side. This latter portion is not irrigated, and is mainly in its unimproved state, and carrying a miscellaneous collection of weeds and weedy grasses. Lucerne has been sown over 70 acres of black land, and is now three years old, while another 20 acres was sown this season. A further 10 acres has been prepared for sowing. The rate of top-dressing of the lucerne has been 1 cwt. per acre, applied twice a year. This was described as "heavy" manuring, but it is, in fact, only a medium rate of application, as a good deal of lucerne is "supered" at the rate of 4 cwt. per annum; this application having been proved profitable by repeated experiments in several irrigation districts. At Murraydale, application of 6 cwt. per acre gave more profitable results than 4 cwt. per acre.

Subterranean clover and Wimmera rye grass have been sown on 30 acres. The usual stocking is with about 1,400 sheep from November to May, and 600 ewes and lambs during winter and spring. The fertility of the soil under irrigation conditions can be gauged from the fact that when maize was grown as the principal crop a yield of 97 bushels per acre was obtained one season. One cow, four draughts, and one light horse are carried also.

Of the fodder exhibited, some lucerne stacks were very poor in quality, due to weediness—the main species were thistles, fat-hen, hogweed, and barley grass. The oaten hay, apparently cut from a self-sown paddock, was weedy and light also. Some last season's hay, included in this stack, was heavier in quality. One lucerne stack was composed of new hay built over a butt of last season's produce. Other stacks were clean, and of a good colour, but rather coarse, as would be expected on such good ground. All the hay was very dry and brittle, and it was difficult to pull out a wisp without breaking off all the leaves. In the winter, however, sufficient moisture will have been absorbed from the air to hold the leaves on this hay during handling.

Mr. W. Prince's property at Murraydale is 66 acres in area, with a "1 in 1" water-right, which is usually exceeded by about 10 acre-feet. Apart from 8 acres of "soda ground," and an area of black sandy soil, the land is typical of the Murraydale flats. According to Mr. Prince, the sandy soil referred to is inferior for lucerne-growing, as the crop begins to wilt very soon after a watering.

About five years ago subterranean clover was sown over 13 acres, and the lucerne paddocks at present total 50 acres, which are top-dressed at the rate of one bag per acre every second year. The total "super." used, before rationing, amounted to 3 tons per annum. Altogether there are sixteen paddocks, and all are reached from a lane through the centre of the property.

The stackyard was the neatest seen during the judging. It has a good three-rail wooden fence, with the two lower rails bolted to the posts, and a cyclone gate in good order. The milking shed and feed shed were along one side of this yard.

One stack was covered with a tarpaulin made from "super." bags which had been painted with a half-and-half mixture of sump oil and tar. Total cost for the paint was £1, and the cover is now three years old. Its main disadvantage, according to Mr. Prince, was its weight, but it was considered superior to some light coverings which are on the market. In Mr. Prince's experience, it is essential to use new bags for this purpose, as each will absorb the paint mixture equally well, and damp patches in the stack will be avoided.

The oaten hay was not the produce of Mr. Prince's own farm, but had been bought in to replace 22 tons of lucerne hay sold earlier, and will be used to mix with lucerne chaff. Six

stacks of lucerne hay are conserved each season, and about 25 tons is chaffed and mixed with the oaten chaff for feeding in the shed; the rest is carted out to the paddocks as required.

Stock carried through the winter consist of 21 milkers, 8 dry cows, 2 rising two-year-olds, 14 heifers to one year old, 5 bulls rising one year old, and 1 bull rising three years. In the herd test, one of Mr. Prince's cows, bred by Mr. J. S. Stedman (Appin South), produced 700 lb. butter-fat. Horses consist of 3 draughts, 1 pony, and 1 rising two-year-old. About 20 store pigs are usually on hand, and grain for these is bought in.

SWAN HILL DISTRICT FODDER CONSERVATION COMPETITION, 1942.—DETAILS OF AWARDS.

Place.	Exhibitor.	Quantity and Quality.	Excess.	Suitability.	Reasonable Condition of Stock.	Location.	Protection.	Green Crops and Paddock Growth.	Total.
—	Maximum points ..	80	60	15	10	10	15	10	200
1	C. O. Jennings ..	70	50	14	9	9	14	9	175
2	W. Prince	78	38	14½	10	9½	14½	9	173½
3	G. D. Brydon ..	78	..	14½	10	9½	14	6	132
4	Miss M. A. Pye ..	60	..	14½	10	9½	14	9	117
5	D. Chisholm ..	19	..	14½	10	9½	14	2	69

JOIN OR FORM A WAR SAVINGS CERTIFICATE GROUP

Organic Matter in the Orchard

For an orchard to maintain fertility, the supply of organic matter must be maintained. In the natural state the soil supports a very varied population. There are first of all the trees, secondly beneath them are the surface plants, and within the soil are the teeming millions of tiny creatures, far too small to be seen with the naked eye, and known under the general name of soil organisms.

Orcharding, as it is generally practised in Australia, by clean cultivation and frequent stirring of the soil in the hot summer months, undoubtedly tends to upset the balance of nature by the elimination of, or, at all events, great reduction in the growth of the second group, the surface plants. The life and decay of the surface plants provide most of that organic matter which is required by the soil organisms in order that they may flourish, and it follows that as the surface plants are reduced and the soil organic matter or humus is depleted, the soil's population of organisms declines. The gravity of this change may be understood when it is realized that it is principally due to the life processes of the soil organisms that the soil nutrients become available to the trees, and so, as their number falls, soil fertility inevitably declines also.

It can therefore be taken as a maxim that the yearly ploughing under of a liberal amount of green stuff is a first essential in orchard management, and it is almost as true that where the growth of natural green stuff is abundant and is ploughed under suitably, the position on that orchard is generally quite satisfactory.

1942-43 Potato Crop

Big Increase in Acreage Required

TO supply the additional requirements of potatoes for next year, the Commerce Department of the Commonwealth has asked that the acreage planted to potatoes in Australia be increased by 50 per cent. next season. The total acreage required from Victoria is 56,500 acres.

In Victoria potatoes will be grown under contract next season. In order to ensure that growers will prepare and plant the required acreage the Commerce Department has guaranteed the following minimum prices for No. 1 Grade potatoes grown in the 1942-43 season:—

For potatoes delivered prior to 31st December, 1942—£10 per ton at local country station.

For potatoes delivered during January, 1943—£9 per ton at local country station.

For Carmans, Up-to-dates, Factors, Delawares, Bismarcks, and Katahdins delivered during February to November, 1943—£8 10s. per ton, Melbourne.

For Brownells, delivered during February to November—£9 per ton, Melbourne.

For other varieties, including Snowflakes, delivered during February to November, 1943—£8 per ton, Melbourne.

The above prices represent a guaranteed minimum, and will operate only to ensure that the market price will not fall below those prices. There will be no interference with ordinary marketing conditions, unless there is a glut of potatoes or an extreme shortage.

The amount of fertilizer normally used per acre will be available to farmers to grow potatoes.

The necessary seed should be secured by farmers, and contracts signed as soon as possible. If any farmer is unable to get seed, application may be made to the Victorian Department of Agriculture, and, if possible, the names of growers who have seed for sale will be supplied.

A Victorian Potato Advisory Committee has been appointed to advise the Australian Potato Committee, and to co-operate with the Department of Agriculture in regard to growers' contracts. The Advisory Committee also will assist in any difficulties that may arise in connexion with digging, bagging, and marketing of the potatoes.

This committee consists of Mr. J. Brake, Superintendent of Agriculture (chairman); Messrs. W. Chapman, of Gordon, representing the Gordon, Wallace, Bungaree, Dunnstown, Romsey and Lancefield districts; A. Boustead, of Dean, representing Dean, Newlyn, Clarke's Hill, Daylesford, Bullarto and Trentham districts; W. Giles, of Koo-wee-rup, representing Gippsland and North-Eastern districts, and J. P. Morrissey, of Colac, representing Colac, Koroit and Warrnambool, and Western districts.

The potato merchants are represented by Messrs. H. G. Tinney (country merchant) and J. Downey (city merchant). Mr. H. Book, Emergency Supplies Committee, Mr. H. Andrews, Purchaser for the Army, and Mr. H. O'Brien, secretary, complete the committee.

The Minister of Agriculture, Mr. E. J. Hogan, officers of the Department of Agriculture, and members of the Victorian Potato Committee will conduct a campaign similar to the flax campaign of 1940 and 1941, to ensure that the additional acreage of potatoes will be planted in Victoria this season. Contract forms will be available at meetings that will be held throughout the potato-growing districts, and from potato inspectors and other officers of the Department of Agriculture. They may also be obtained, together with any further advice required, upon application in person or by letter to the offices of the Department of Agriculture, at Melbourne, Ballarat, and Wangaratta.

It is confidently expected that the full co-operation of farmers will be obtained in this important campaign, and they are asked to commence immediately the preparation of the necessary land.

Pitting Potatoes

By J. T. RAMSAY,
Potato Expert

Potato Storage Pits.

THE best storage method for potatoes which have to be kept for several months, and are intended *for consumption,* is that provided by "pit" or "clamp" storage.

The term "pitting," although well understood and generally used in the potato trade, is somewhat misleading to those not closely associated with potato growing, as it suggests a cavity or hole in the ground into which potatoes are placed for storage. Exactly the opposite, however, is meant when the term "pitting" is applied to potatoes, for when "pitted" they are actually stored at above-ground level. The term "clamp," too, does not convey an accurate idea of this storage method.

These two terms are used in the trade to describe this manner of carrying potatoes, intended for consumption, over more or less extended periods with the least possible depreciation in quality, weight, and condition.

At the outset, it should be understood that this method is *not* applied to potatoes intended for *seed* purposes.

In choosing a site for the pit, consideration should be given to its convenience to the field on which the potatoes were grown and its convenience as a location from which the potatoes subsequently will be taken for final despatch.

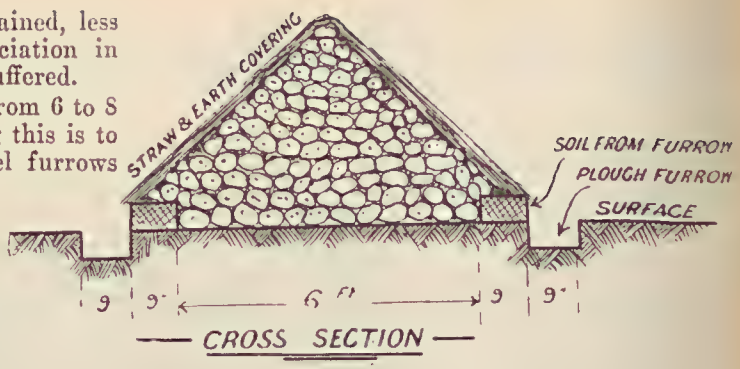
A point of prime importance is that the site chosen shall be well drained and, if it can be arranged, in a sheltered position.

Good drainage is essential for the proper keeping of the potatoes stored, and the shelter for the convenience of those engaged in the grading and bagging from the pit. In the majority of cases this grading and bagging has to be done in the open, often in inclement weather.

At the present juncture, because of the limited quantity of potatoes in Australia available for table use from now until the next season's crop is ready, it is necessary that existing stocks be preserved, in order that a period of shortage, if not of actual dearth, may be avoided. "Pitting" is the best method of securing this conservation, as by this method

of storage less loss in weight is sustained, less wastage is involved, and less depreciation in condition and cooking quality are suffered.

A convenient width for the pit is from 6 to 8 feet, and an effective way of framing this is to plow inwards to the pit two parallel furrows —say, 9 to 10 inches in depth—so that the required width of pitting space lies between them. These furrows act as checks for the potatoes to be built up from, and also further accelerate drainage. The length of the pit will depend on the tonnage of potatoes to be stored; provided the site chosen is suitable, the length of the pit can be extended as desired. Sound potatoes only should be pitted, and they should be built up as steeply as convenient—an angle of about 45 degrees is practicable.



Potato Pit.

As the pit progresses, and even before it is finished, thatching may be commenced. Rye or wheat straw—or reeds, where available—are preferable to oaten or barley straw, as they are not so likely to consolidate and restrict the ventilation essential for safe storage. Only sufficient thickness of thatching should be given to prevent sunlight getting access to the potatoes on the surface layer of the pit. If the ends and sides of the pit are built up to the angle suggested, viz., 45 degrees, a fairly light thatching will shed off any rain.

The thatch may be secured against wind by a light covering of soil, or by rails or quartering. In cases where soil is used it should not be placed higher on the sides of the pit than 9 inches from the top of the ridge on either side. This will mean that the ridge is left unprotected save from the light. This point is vital to correct economic storage.

The potatoes pitted—as well as being firm and sound—should be reasonably dry.

Where conditions preclude the degree of dryness desirable, the risk of damage from excess moisture can be minimized, if not entirely obviated, by placing ordinary drain pipes vertically arranged from the level of the bottom of the pit at, say, 4 feet intervals, so that they project about 6 inches above the ridge.

Potatoes stored in this manner will keep in excellent condition well into the spring. The districts most suited to this method of storage are those high cool districts where most of the potatoes in Victoria are grown.

Onion Seed for Britain.

This crop of onions, grown by Miss R. Amey and Mrs. A. C. Rooney on the Avon River flats in the Maffra district, yielded 10½ lb. of seed from 300 bulbs.

Neither artificial manure nor irrigation was used.

The seed is included in the consignment to be sent to home gardeners of Britain, under the Onion Seed Gift Scheme.

Blossom-Killing Sprays for Apple Trees

by C. E. COLE, B.Agr.Sc., Horticultural Research Officer and D. M. McALPIN, B.Agr.Sc., Assistant Horticultural Research Officer.

THERE is always interest in sprays which will destroy fruit-tree blossoms, chiefly because of their seeming promise of release from the laborious task of thinning too-heavy crops and the possibility of breaking the alternate bearing habit of many varieties. War conditions, furthermore, have provided additional reasons why the crop should be removed early in the season from large areas of apple orchards without injuring the trees. Many orchardists have felt it their duty to serve their country, and their gardens are untended. Markets are lost, prices fall, and the less favorably situated apple grower finds that he must turn his efforts in other directions. Labour becomes scarce, and only a part of many orchards can be worked efficiently.

It is not logical to leave these areas to the pests and diseases which plague the fruit grower. It is not logical to destroy the trees, which represent a big capital investment. But it is logical to destroy the crop which would serve as a breeding ground for pests.

The most practicable way of doing this is to use a blossom-killing spray, and consequently the demand for such sprays is high at present. The information set out below is the result of two years' experiments and experience with such sprays on apple trees.*

Blossom killed by spraying with cresylic acid.

Apple blossom in the pink-bud stage.

The ideal blossom-killing spray must be cheap and easy to use. It must kill every blossom, and must not injure other parts of the tree. Two sprays—cresylic acid and tar distillate—have been found to approach the ideal, and a third—di-nitro-cresol, commonly called DNC—appears to be still nearer to it. With each of these sprays, practically every blossom on sprayed trees was killed, and no serious damage or setback to other parts of the trees occurred.

Effects of the Sprays.

The sprays referred to are damaging to flowers, fruits, leaves, and young shoots, but not to mature bark. As much damage as possible must be caused to the flowers, and as little as possible to other parts of the tree. Fortunately, as the flowers of apple trees appear before the new shoots and leaves—except the small ones around the blossom clusters—they can be sprayed and killed without causing any lasting damage to the rest of the tree. Sometimes the small spur leaves are killed too, but this has no serious effect on the tree, as they are replaced in three or four weeks.

The blossoms are killed chiefly by the effect of the spray on the flower stalks. The petals are quickly affected and, with cresylic acid, brown off within a few minutes, but the rest

Apple limb at the ideal stage for applying a blossom-killing spray.

of the flower may remain uninjured. The stalk of the flower, or else the little cup around the stigma must be wetted and injured by the spray, or the flower will form into a fruit, usually distorted and useless. For this reason, the best time to spray is when the stalks are most exposed, that is, about the "pink" stage of a blossom cluster. For this reason, too, varieties with loose clusters of flowers with long stalks, like Granny Smith, are much more easily attacked than those with tight clusters of short-stalked flowers, like Statesman. Furthermore, a spray application which thoroughly drenches the trees is more effective than a normal application.

Cresylic acid causes an almost immediate wilting and browning of the blossom and, if the mixture is too strong, of the young spur leaves also. Tar distillate and DNC are slow in action, wilting and browning appearing in a day or two, and shedding of blossoms and young fruits continuing for a month or more after spraying.

Blossoms which are partly wetted only may develop into young fruits. In the case of cresylic acid sprays, these fruits will be badly distorted; with the other two sprays, they will be badly russeted. In either case the fruits are commercially useless, and must be pulled off by hand—a costly operation.

The motto for blossom-killing sprays, as with all sprays, is: "It pays to be thorough."

Subsequent Effects.

Trees which have had their crops removed by blossom-killing sprays grow very strongly, and produce an abundance of plump blossom buds for the following year. If allowed to crop that year a tremendous amount of fruit will be set. Pruning therefore should be more severe than normal to reduce the crop to an amount which the trees can bring up to size.

When to Spray.

The best time to spray usually is when 5 per cent. of the blossoms are fully open.

Blossom clusters in all stages from late green-tip to full-bloom are easily killed by the sprays, although the younger the cluster, the more rapidly it is killed. The older the cluster the greater is the number of leaves around it, and the more damage is likely to be done to other parts of the tree. The cluster itself is harder to wet, and much more spray is required to drench the tree thoroughly; about one-third more spray is required at full bloom than at the 5 per cent. blossom stage.

Although it is better to spray as early as possible, account must be taken of the fact that all the blossom clusters of one variety do not open together. Quite often, by the time the latest buds are at the green-tip stage, the earliest are in full bloom. For most varieties the best chance of a single spray being successful is at the 5 per cent. blossom stage. Where long lateral growths are numerous, spraying may have to be delayed until full bloom, because their buds usually open much later than typical spur buds.

Certain varieties, like Rome Beauty, habitually open their blossoms over a very long period, so that some have already set, while others are just bursting. Some trees may have limbs which are backward, because of woolly aphis attack, for instance, and bud-burst is much later than normal. In either case one spray application, delayed even to

Severe effect of two per cent cresylic acid spray on Statesman apple. Later recovery was complete.

Left—Granny Smith apple tree two days after spraying with cresylic acid. Right—The same tree a month later.

full bloom, may not give a satisfactory kill. Therefore, either two sprays may be given, or one spray applied when it will kill most blossoms, and the fruits from later blooms may be removed by hand.

Varietal Differences.

The main Victorian varieties have been attacked successfully. The chief difference occasioned by variety is the amount of spray required to wet the blossom clusters thoroughly. The difficulty of spraying the varieties increases in the following order:—Granny Smith, Delicious, Rome Beauty, Ballarat (Stewart's Seedling), Yates, London Pippin (Five Crown), Jonathan, Rokewood, Statesman.

For easily-attacked varieties the spray strength may be decreased slightly, and for the more difficult varieties it may be increased.

Methods of Application.

The best results are obtained when the spray is applied with a gun at high pressure. The pistol and rod are both satisfactory, the rod requiring more time but less spray. Great care should be taken to wet projecting laterals and tips of leaders, which are easily missed.

Materials and Strengths.

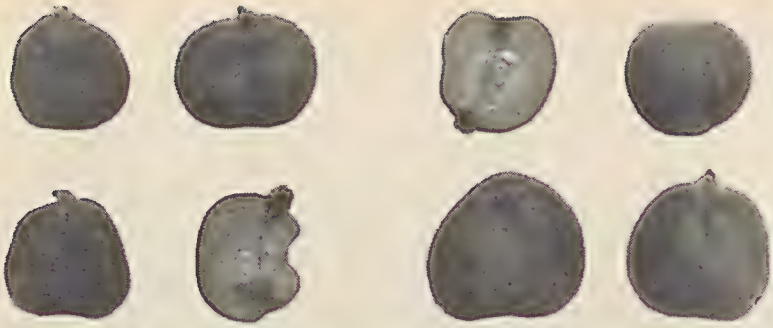
(*a*) **Cresylic acid** is usually obtainable in a 98 to 99 per cent. pure form at prices ranging from 6s. 3d. to 7s. 6d. per gallon. At present supplies are limited. In the concentrated form it is capable of burning the skin severely, and great care should be exercised in using it. When diluted it is harmless, but may make the face and eyes smart. It smells like phenyle or carbolic acid.

The best strengths are 1 to 1¼ per cent. (1 to 1¼ gallons in 100). This strength kills the blossoms, but usually not the young leaves. The efficiency of the spray is greatly increased if the acid is emulsified with soft soap before mixing. This can be done by boiling 3 lb. of soap in 1 gallon of water for each gallon of acid until the soap is dissolved, adding the acid and stirring vigorously or pumping until the mixture forms a cream. The mixture is used at the rate of 2 to 2½ gallons per 100 gallons of spray.

The strength may be decreased very slightly (say, to $\frac{9}{10}$ths per cent.) for easy varieties if it is found that the 1 per cent. spray is causing more leaf injury than seems necessary. For different varieties it may be found that an increase of ¼ per cent. in the strength of the spray is required. It is a general rule that, as the strength is increased, the damage to leaves increases also. However, even at a 2 per cent. concentration, when all leaves on the tree were killed practically instantaneously, no permanent injury occurred. After three to four weeks new healthy growth had completely replaced the dead foliage.

(*b*) **Tar distillate**, commonly used for the control of the green peach aphis, is an effective blossom-killing spray. It is necessary to use it at the strength of 3 gallons in 100 gallons of spray to obtain the desired results. At this strength most of the leaves are killed, but are soon replaced. The action of tar distillate is slow. The skin must be protected while spraying.

(*c*) **DNC (di-nitro-cresol)** is an odorless chemical dissolved in emulsified oil which causes no burning or irritation to the person spraying, but does stain the skin yellow. The



Left—Young fruits distorted as a result of injury by cresylic acid spray in blossom stage. Right—Young fruits russeted by spraying with tar distillate in blossom stage.

best strength appears to be 1½ to 2 per cent. of the oil preparation, although trials are not yet complete. Its action is slow, but foliage injury is much less than with tar distillate.

(*d*) **Other Materials.**—Many other materials have been tried by growers for blossom killing. Nitrate of soda is ineffective. Weed killers are apt to cause permanent damage to the trees. Bluestone at 1 per cent. strength may kill three-quarters of the blossom, but besides badly russeting the remaining fruits it is, in the light of our present knowledge, far too drastic in its effect on the spurs. None of these materials can be recommended at present.

Costs.

As each grower knows just how much spray is required for his trees, the costs for materials only are given in Table I. for trees requiring from 3 to 6 gallons of spray for a single application:—

TABLE I.

Spray Material.	Concentration of Spray.	Cost of Spray Material per Tree Requiring—			
		3 gall.	4 gall.	5 gall.	6 gall.
	%	pence.	pence.	pence.	pence.
Cresylic acid emulsion	1	3	4	5	6
Tar distillate ..	3	5½	7½	9	11
DNC	1½	3	4	5	6

Even if labour could be obtained removal of the crop from a "5 gallon" tree by hand-pulling would cost at least 2s.

Biennial Bearing Control and Thinning.

The use of these sprays for crop reduction and crop thinning is limited by the fact that blossoms not killed are almost invariably injured by the spray. The injury later takes the form of russeting and malformation, the latter rendering the fruit commercially useless. Experiments in which different strengths, times, and methods of application were used were carried out with little promise of success. The only hope appears to be a reduction of the number of fruit clusters by spraying at the green-tip stage, when many blossom buds which are far less advanced will not be injured by the spray.

Observations.

Two of the blossom-killing sprays were observed in the experiments to have an effect on woolly aphis and black spot. Cresylic acid almost completely controlled woolly aphis on the trees, but did not control black spot. Tar distillate had little effect on woolly aphis, but trees sprayed with it were practically free of black spot during the season, and the leaves were a deep, healthy green colour.

Certain Jonathan trees sprayed with 2 per cent. cresylic acid were rather severely checked by the spray. The new growth was markedly affected by the irregular yellow blotching of the leaves known as infectious leaf variegation. Unsprayed trees were only slightly affected.

Acknowledgment.

The assistance of orchardists in the Tally Ho and Ringwood districts in the experimental work is acknowledged.

*See also *Vic. J. Ag.*, Sept., '41—"Blossom Killing Sprays for Apple Crop Restriction," by F. M. Read.

WHEAT HAS EARS!

SO HAS THE ENEMY!

DON'T TALK!

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows.

Keep Cows Warm and Dry.

COWS must be adequately fed to prevent them losing condition and dropping in milk yields, and to enable them to respond fully to the spring flush later on. If newly-calved cows are rugged and all cows are grazed in sheltered paddocks, particularly sheltered night paddocks, less feed will be required to keep them warm and higher yields will be obtained.

Wherever possible the cows should not be driven along very muddy laneways, or allowed to stand in muddy yards. It requires extra energy, and therefore extra food, for cows to wade through mud, and it pays ultimately to concrete the holding yards and maintain lanes in good order.

Rubber and Tin.

Rubber and tin are two commodities widely used in dairy machinery and utensils, and now scarce on account of enemy action. Farmers and others engaged in the dairying industry are advised to protect their rubber and tinware and make them last as long as possible, in view of replacement difficulties, and also to assist in the war effort.

The rubber tubing and inflations on the milking machines should be thoroughly washed and carefully sterilized to remove all grease and germs. Grease is the principal cause of rubber perishing, and it must be removed to ensure a long life for all the rubber parts.

Moisture and the corrosive products of germs working in it are the principal causes of tinware rusting. To preserve the tinning, all utensils, cans, and other tinware should be thoroughly washed and sterilized with steam or boiling water and stood upside down in a dry atmosphere to drain, and remain dry until re-used.

Not only will the life of the rubber and tinware be increased by thorough washing and sterilizing, but the keeping quality of the dairy produce will be improved also.

Sheep.

Fleece Testing Service.

To assist breeders to eliminate hairy types of sheep from their flocks, the Fleece Testing Section of The Gordon Institute of Technology, rams, and their progeny for a small charge. Geelong, undertakes to test the fleeces of ewes, In the past, many breeders have used this

service to enable them to select breeding stock with a minimum amount of hair and kemp in their wool. Breeders desirous of having their sheep tested this season should communicate with the Principal of the Institute, or the Superintendent of Live Stock, Department of Agriculture, Melbourne, immediately.

Shearing Regulations.

Sheep farmers and graziers should make themselves familiar with the National Security (Man Power) Regulations concerning shearing operations this year.

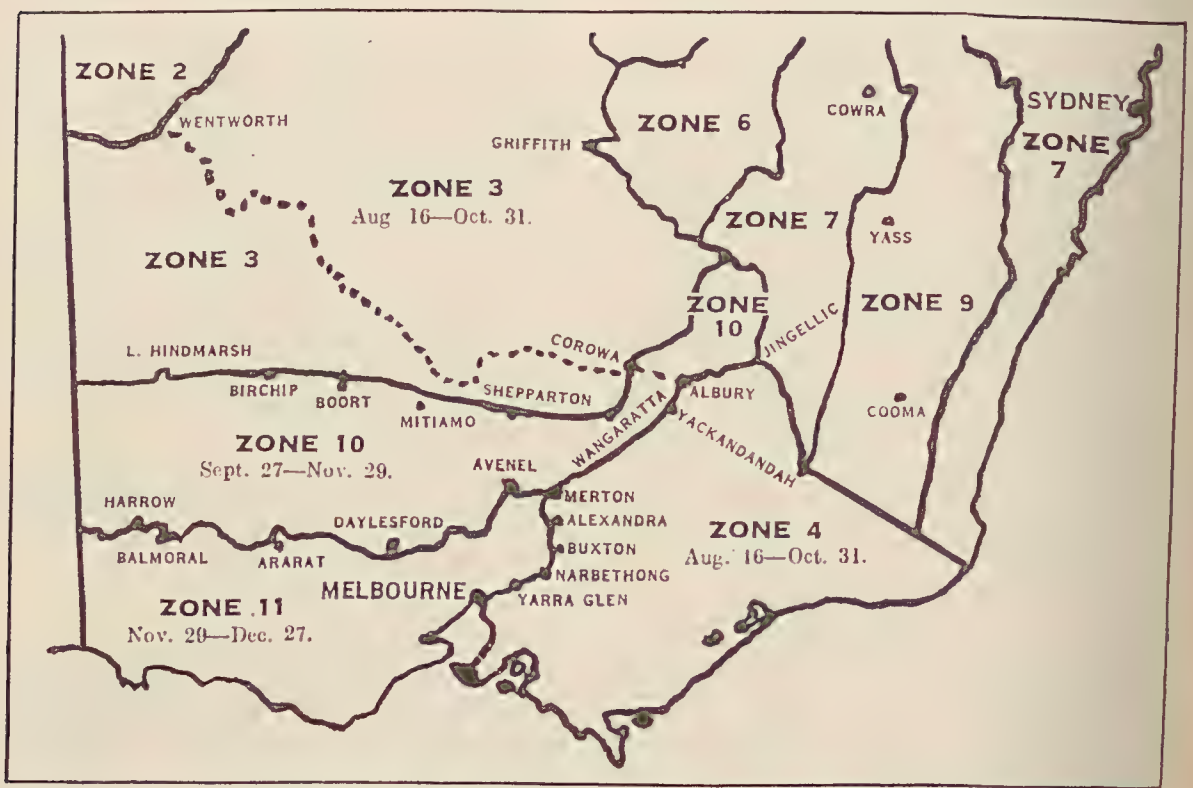
These regulations do not apply to the shearing of rams and stud sheep, or to flocks of less than 1,000 head. To assist sheep owners it has been provided that any owner may conduct his shearing at any time, provided that the skilled and unskilled labour necessary for this work is carried out by his permanent employees or with the help of neighbouring sheep owners and their permanent employees; that he is the owner of the sheep to be shorn, and that such flock is depastured on the property of which he is the owner or occupier.

For all sheep owners with a thousand or more head other than stud sheep, Victoria has been divided into zones, and within each zone sheep must not be shorn between certain specified dates. Any owner who has reason to alter his shearing date may apply to the Director of Man Power to have his shearing time reviewed.

In early June, Application Forms for Registration, Seasonal Workers' Register, were distributed, and these are obtainable at local police stations and at the offices of the National Service Officers stationed at various country centres. It is optional whether seasonal workers, who include woolclassers, shearers, &c., fill in these forms or not.

The object of the Seasonal Workers' Register is to grant men exemption from being called up for service in the forces for the period during which they are prepared to follow seasonal occupations in rural production.

In the interests of the wool-growing industry, flock owners knowing the whereabouts of skilled shearers, shed hands, &c., should see that such men fill in and return the Seasonal Workers' Registration Form. The filling in of clause 7 of this form, which requires the worker



Shearing zones. The dates given above are for the periods in which sheep in each particular zone may **NOT** be shorn.

to do seasonal work other than that connected with shearing, is entirely optional, and if so desired may be disregarded.

[N. A. Bowman, Sheep and Wool Expert.

Pigs.

It is good business, and it is patriotic to market pigs at heavier weights.

An early increase of 20 per cent. in production of pig meats should be obtained by carrying pigs to heavier weights before selling them for slaughter. From the information available, it appears that an increase of more than 50 per cent. is required to meet unprecedented demands.

Many farmers have responded during the last few months by putting more sows into their breeding herds, but the progeny of these sows will not be ready for slaughter for some months, and an early increase depends on carrying pigs to heavier slaughter weights. This can be done without causing any serious upset within the industry.

In some markets there is a good demand for light porkers weighing from 50 lb. to 70 lb. dressed at very high prices per lb., and it is only natural that those who can, should supply this particular trade. Those who have not a very attractive market for light porkers should aim at selling much heavier pigs.

It requires a few more weeks and more food to produce a heavier pig, but it should be realized that, as the selling weight increases, the overhead cost per lb. decreases.

Provided they are in prime condition, pigs of 160 lb. carcass weight are in good demand, and as the price per lb. for prime baconers from 120 lb. to 160 lb. is generally the same, pigs of such weight give a bigger turnover than lighter pigs. The cost of either producing or purchasing the weaner pig can be spread over 120 lb. or 160 lb. It is not only helping a national cause, but it is sound business to market pigs at heavier weights.

In carrying pigs to heavier weights care should be taken not to make them too fat. More weight without excessive fatness can be achieved even with the smaller type of pigs by limiting their ration in the last part of their feeding period.

As previously advised in these notes, a good plan to follow in the case of the big bacon type pigs is to feed half a gallon of separated milk or ¾ lb. of meatmeal daily per pig with some green food or pasture, and as much grain as the pigs can eat until they are consuming 6 lb. of grain per head daily, and then keep them on that quantity of food until they are marketed. In the case of the more compact, porker type pigs, it would be necessary to limit the grain allowance to a maximum of 5 lb. per head daily.

When pigs are not on good pasture or have not an abundance of green food or legume hay or chaff, the above quantity of meatmeal or separated milk should be increased by half.

With grain feeding, as suggested, a mineral supplement of 4 parts ground limestone and 1 part salt should be provided. When much separated milk is available, each gallon may be used to replace 1 lb. of grain, or, if whey is available, 1½ gallons of whey may replace 1 lb. of grain.

[L. A. Downey, H.D.A., Pig Expert.

Watering Horses.

It has long been recognized by careful horse masters that working horses always should be allowed access to water before they receive their feed. As a rule, a horse that has been working is thirsty, and will drink readily when offered water. When he has had a drink he may then be fed. This is the correct procedure and should not be reversed, because if a horse has his feed first, and then a drink, a certain amount of undigested food will be washed out of the stomach into the intestines, where fermentation and gas formation will occur and may lead to the animal suffering from an attack of colic, or "gripes" as it is commonly termed. This is principally owing to the small size of a horse's stomach, which will not hold a full feed, consequently some of the food is carried on into the intestines before it has been sufficiently digested by the gastric juices in the stomach. If a horse is not working and has free access to water all the time he will not become very thirsty, and will help himself to only small quantities of water at a time. It is quite safe to give a horse a drink when he is heated, provided that he is not exhausted, when he should be allowed to settle down before having water and food given to him.

[W. M. Lerew, G.M.V.C., Veterinary Officer.

Poultry.

Feeding Chickens.

Chickens must be fed well on very nutritious foods right from the commencement. The ration should include foods rich in protein, such as meatmeal, meat, or milk and its products, and low in fibre.

Food and water may be given about 24 hours after the chickens are hatched, but the amount eaten will be small during the first day or two. It makes very little difference if they are not fed until 48 hours after hatching, but if delayed too long the chickens may become ravenously hungry, and eat too heavily at the first feed.

Poultry keepers in a small way may find it more convenient to use reliable commercially mixed foods rather than buy the ingredients and mix their own, but it is much cheaper to buy the ingredients and mix the foods on the farm.

There are many rations and feeding systems used by poultry farmers, and if good results are obtained there is no reason to change, but the following mash mixtures with cracked grain and greenstuff have given good results:—

—	Mixture 1.	Mixture 2.	Mixture 3.
	lb.	lb.	lb.
Ground wheat ..	40	30	50
Ground hulled oats	20	10	30
Ground maize ..	20	40	..
Bran	10	10	10
Dried buttermilk ..	10	5	..
Meatmeal ..	..	5	10
Common salt ..	½	½	½

These can be given as a dry or wet mash. The usual custom is to have a dry mash always available, and to feed a wet mash a couple of times a day.

It can be fed from the first feed when the chicks are about a day old until they reach maturity, or until they are well grown and then fed on an adult ration. For the grain portion of the ration, 60 lb. cracked wheat, 20 lb. cracked hulled oats, and 20 lb. cracked maize make a very good mixture. Only a small amount of grain is usually fed at first, and the quantity gradually increased. After the chickens are about eight weeks old the grain may be more coarsely cracked or fed whole.

Dried buttermilk and skim-milk powders are required for export to Great Britain, and are less readily available and more expensive than formerly. Meatmeal, therefore, is recommended as the protein supplement. Maize also is scarce and expensive on account of transport difficulties and a poor crop in Queensland, but cracked and ground wheat and oats may be fed in its stead. Portions of the ground wheat and ground oats may be substituted with ground barley. Ground grains are more nutritious than the various by-product meals such as bran, pollard, &c.

Fine shell-grit and finely granulated charcoal should be available also in separate hoppers for the chickens.

It is important that the chickens should receive as much tender green food as they can eat at least once a day. A liberal supply of fresh and clean drinking water always should be at hand. With proper management and a variety of plain, wholesome, and nutritious foods, the chickens are provided with all the nourishment and vitamins necessary for their health and growth.

Chickens should be exposed to direct sunshine, as this is necessary for proper bone development, and the prevention of rickets.

Proper food and water vessels should be provided in order to keep the food clean and prevent waste, and they should be placed in positions where the chickens cannot walk into them.

If chickens are to do well, it is important that they be bred from strong, vigorous, and healthy stock. It should be remembered also that diseases, constitutional weaknesses, vices, &c., can be prevented by providing chickens with comfortable quarters, clean floors and runs, proper heat and ventilation, outside exercise and sunshine, a correct diet with ample green food, and regularity in management.

[H. F. Clinton, Poultry Expert.

Bees.

Except in the lower Murray Valley and the north-western desert area bees will be generally inactive, but by the end of the month breeding will have started and a fair amount of sealed brood will be noticed in most districts. Occasionally, in abnormal seasons, hives have maintained a considerable amount of brood through the winter.

Naturally, the consumption of honey is much heavier during the breeding period, and all hives should be examined. Any that are found to be short of stores should be supplied with frames of sealed honey taken from hives with a surplus. This will carry them through to the spring flow of nectar. When no surplus frames of sealed honey are available, the hives should be fed with sugar syrup.

Except in the Goulburn Valley and north-eastern districts the honey flow has been good, and some apiarists have had the best season for years.

[*Continued on page 378.*

Poultry Feeding Experiments

A Review of Twenty Years' Work

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

TO determine the value of different foods and feeding methods for egg production, feeding tests with laying hens have been conducted annually at the State Research Farm, Werribee, for the past twenty years. Since 1921, 156 different pens of White Leghorn or Australorp pullets have been fed 90 different rations comprising 28 different foodstuffs, twelve mineral mixtures, and cod liver oil.

The tests were carried out first by Mr. W. C. Rugg, a former poultry expert of this Department, then by Mr. W. O. Pederick, Assistant Poultry Expert, and since 1926, by Mr. A. G. Clark.

In these tests the number of eggs laid, and the quantities of the different foodstuffs fed, have been carefully recorded, so that the differences in the values of the eggs laid, and the costs of the foods fed can be worked out. Soft-shelled eggs laid on the floor, and eggs laid while the birds were on the perches and falling into the manure have not been recorded.

Generally the rations used have been good ones, so that the differences between the egg yields of the pens receiving different rations have been small, and the monetary returns over food costs have been governed more by the relative cost of the ingredients in the rations than by the number of eggs laid or the total quantity of food eaten. However, nine rations proved inadequate for efficient egg production, and the performances of the pens of birds receiving them are shown in Table 8. Comparisons between the performances of the birds in the other 147 pens have been made more fully.

In some years it was not possible to conduct the tests for the full twelve months. Therefore, it has been necessary to correct the egg yields and food consumption to a twelve-month basis.

Variations in hatching, seasonal and other conditions, as well as a general improvement in the birds, have made comparisons between the egg yields of different pens in different years very unreliable. Therefore, a method has been adopted whereby the differences between the egg production of each pen and of all the birds in the feeding tests during the same year have been used. These differences have been averaged, and the average added to the average production of the 147 pens receiving good rations during the past twenty years, to arrive at the calculated comparative egg yields of the birds on the different rations.

Variations in Egg Yields.

There has been a very close relationship between the quantity of food fed and the egg production of the birds, and, generally, when a large quantity of food has been eaten, egg production has been high, and vice versa. This is shown graphically in Fig. 1. However, in 1926-27, 1927-28, and 1940-41, the quantity of foodstuffs fed to the number of eggs laid was very much greater than usual. This is believed to be due to the facts that amongst the four pens receiving reasonably good rations during 1926-27 lucerne chaff was used as a substitute for greenstuff in one pen, and broom corn was tried in a third; amongst the four pens on good rations in 1927-28, cod liver oil was added to the mash in two pens, and both wet and dry mashes were fed in a third; and amongst the ten pens on good rations in 1940-41, mashes containing 10 per cent. of meat meal and 15 per cent. of dried butter-milk, which were very rich in protein, were fed in eight pens, and, in four of these pens, brewers' grains were used as a substitute for bran.

The annual variations in the quantities of foodstuffs fed cannot be fully explained. They are probably due to factors such as palatability of the food, its quality, composition and digestibility; the amount of fibre it contains; the rate at which it passed through the birds; and the quantity and quality of the greenstuff fed. The quantities of food wasted by the birds, and the quantities eaten by sparrows, rats, mice and other vermin are variables which cannot be determined, and which affect the quantities of foodstuffs fed to the birds. However, to all intents and purposes, the quantity of foodstuffs fed can be regarded as the quantity consumed by the birds. In all trials the birds have been offered as much food as they will eat without any obvious waste.

The annual variations in egg production appear to be determined principally by the quantity and nature of the food consumed, but other factors such as hatching and rearing conditions, breeding of the pullets, and seasonal conditions, also would have some influence on production. Furthermore, these factors would have some influence on the appetites of the birds, and, in that way, by altering food consumption, egg production would be altered.

A study of the graph (Fig. 1) shows that, generally, egg production has tended to increase as the result of the good selective breeding practised.

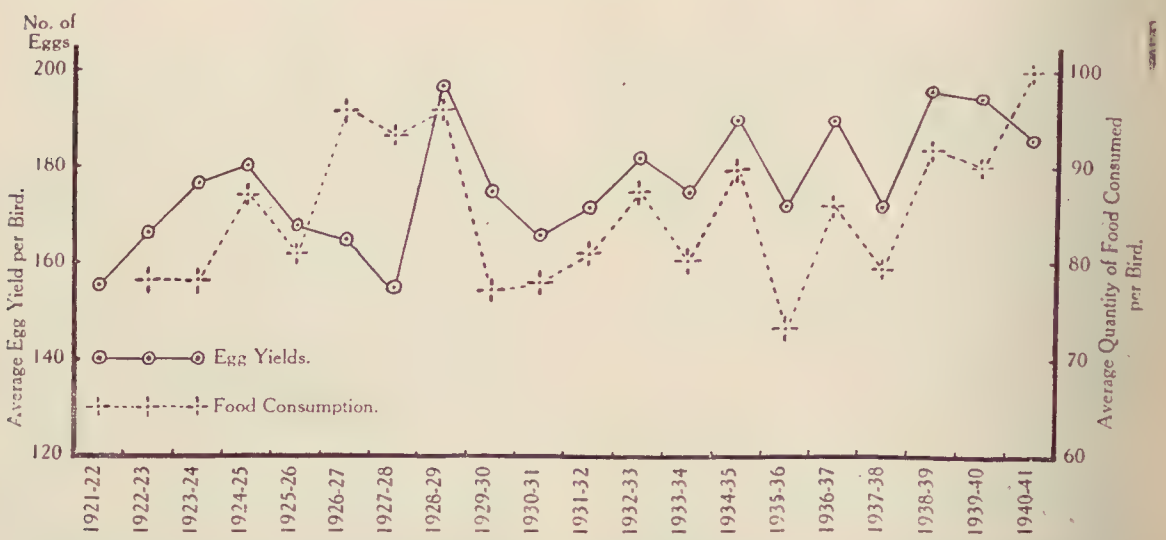


Fig. 1.—Showing relationship between egg yields and food consumption over a period of twenty years.

STUDIES ON 147 PENS OF BIRDS RECEIVING GOOD RATIONS.

Method of Feeding.

In the trials good results have been obtained with both wet and dry mashes (see Table 1), but highest egg yields have been obtained when these mashes have been fed together, or with a continuously available or free choice of grain mixtures. When grain has been fed in the litter, dry mash has proved better than wet mash. This may be due to the fact that, with dry mash, feed is always available and the birds can eat as much as they require, whereas with wet mash it is possible that some of the birds are unable to get sufficient, particularly if the fixed amount of mash and grain given to them is slightly under-estimated. With a dry mash, free choice meals and grain or mixed grain fed in vermin-proof hoppers, there is less waste than with wet mash or feeding grain in the litter.

TABLE 1.—SHOWING EGG PRODUCTION AND QUANTITY OF FOOD FED TO BIRDS ON DIFFERENT METHODS OF FEEDING.

Method of Feeding.	Number of Pens.	Production per Bird. (Number of Eggs.)	Food Fed per Bird.
			lb.
Wet mash, free choice grain	1	189·3	96·0
Wet and dry mash, grain in litter	2	186·3	106·0
Dry mash, grain in litter ..	47	181·8	91·2
Dry mash, free choice grain	20	181·5	77·4
Wet mash, grain in litter	33	177·7	88·4
Free choice meals and grain	36	177·0	81·6
Soaked grain	8	175·9	76·5
Average ..	147	179·3	85·7

Grain usually is fed in the litter so that the birds receive exercise scratching for it, but the good results obtained by feeding the grain in a hopper which is always available to the birds tends to indicate that this exercise is unnecessary. When grain is fed to the litter, the birds will probably eat much more manure and filth than is the case when grain is fed in hoppers. This latter method is regarded as being much healthier, and by adopting it, less grain will be wasted by the birds and eaten by vermin.

Birds fed solely on free choice grain and meals have laid fairly well, but, in comparison, the egg yields obtained with wet or dry mashes have been better, and the reason suggested is that the individual birds do not balance their rations properly, and eat most of those foods which are to their liking. With free choice feeding, the grain also is fed free choice in hoppers, and it has already been shown that birds receiving free choice grain (or continuously available mixed grain) with wet or dry mashes, have produced better than those fed grain in the litter. However, the birds have eaten less food on a free choice ration, and there has been very little economic difference between free choice and wet or dry mashes, as the fewer eggs and less food have approximately balanced.

Soaked grain feeding is another method tested where the egg yields and the quantity of food fed both have been lower than those obtained with wet and dry mashes, but, as grain has been more expensive than bran and pollard during the past two years, these rations would have been dearer per pound and have cost fully as much as the mashes. As soaking grain requires as much labour as grinding, the grinding of grain and feeding it as a wet or dry mash is recommended (see Table 4).

In all the rations shown in Table 1, shell grit was always available in the pens, and, with the exception of one pen which received lucerne chaff, the birds were fed a liberal and continuous supply of greenstuff. With the exception of a few pens in the earlier experiments, each pen contained 50 pullets. Any birds that died were replaced, in most cases, with birds fed on standard rations, as no birds were maintained on the various test rations for replacement purposes. However, with the exception of one pen in which no greenstuff was fed (see Table 8), mortality has been fairly consistent amongst the pens and very low, averaging less than 10 per cent. Full reports of each feeding trial have been published annually in this *Journal*, and summaries with the egg production and quantities of foods fed are available in the "Poultry Farming" book published by this Department. This book may be obtained on application to the Stores Branch, Department of Agriculture, Melbourne, C.2, at a cost of 2s. 6d., post free.

Protein Supplement.

In feeding poultry, it is now widely known that a protein supplement, in addition to other meals, grain, greenstuff and shell grit is necessary.

The feeding trials at Werribee have given some very valuable information on the suitability of these protein supplements for laying hens, and, undoubtedly, when cost is taken into consideration, meat meal (or fresh boiled livers) as the only protein supplement have been the most successful. Higher egg yields have been obtained with dried butter-milk and mixtures of dried butter-milk and meat meal, but the increased egg yields have not been sufficient to pay for the more expensive rations, even though the birds receiving dried butter-milk were given 3 lb. less food than those receiving meat meal only. The birds receiving both meat meal and dried butter-milk were given 10 lb. more food.

The results obtained from pens of birds receiving different protein supplements are shown in Table 2.

TABLE 2.—THE EGG PRODUCTION OF AND QUANTITIES OF FOOD FED TO BIRDS RECEIVING DIFFERENT PROTEIN SUPPLEMENTS.

Protein Supplement.	Number of Pens.	Production per Bird. (Number of Eggs.)	Food per Bird.
			lb.
Meat meal and dried butter-milk	12	184·1	96·2
Dried butter-milk ..	12	183·6	83·0
Meat meal	89	179·8	86·1
Livers, fresh, boiled ..	2	179·8	82·0
Meat meal and rape seed meal	3	178·6	80·7
Meat meal and coconut meal	7	177·6	72·1
Dried butter-milk and dried whey	1	177·3	90·0
Meat meal and maize oil meal	4	175·3	86·0
Meat meal and dried whey	5	174·5	80·2
Nil	7	174·2	87·0
Meat meal and lucerne chaff	3	174·0	96·3
Meat meal and linseed meal	2	164·8	70·0

Birds receiving rape-seed meal, coconut meal, maize oil meal, dried whey, lucerne chaff, or linseed meal in addition to or as a partial replacement of meat meal have, on the average, all laid fewer eggs than those birds receiving meat meal (usually 10 per cent. of the mash) as the only protein supplement.

As the number of pens receiving each of the additional protein supplements was small, it could not be accurately stated which was the best of the supplements, but the significant fact is that in every case, excepting when dried butter-milk was used, production has been lower than with meat meal only. It is interesting to note that the quantity of food fed to birds receiving coconut meal and linseed meal—two foods with some common physical properties—has been very low. The two pens receiving linseed meal were fed protein supplement, bone meal, whole mixed grain with greenstuff and shell grit only, and as this is one of the poorer types of rations (see Table 3), the low egg yields and quantities of food fed are not entirely due to linseed meal.

The conclusions drawn from the results shown in Table 2 are that meat meal is the cheapest and best protein supplement on the commercial poultry farm, unless cheap supplies of fresh meat or livers are available, and that the addition of other protein supplements to give variety where birds receive ample greenstuff and mixed grain is unwarranted. Trials with skim milk and fresh meat (excepting livers) have not been carried out, but it is generally known that very good results have been obtained elsewhere with these foodstuffs as the protein supplement.

The Kind of Rations.

MEAL, PROTEIN SUPPLEMENT, GRAIN.

The kind of rations fed to poultry are fairly well standardized, and generally include a mixture of various meals or ground grain containing a protein supplement, usually 10 per cent. of meat meal, and grain. As all the pens at present under consideration were fed liberal supplies of greenstuff and shell grit, these commodities have not been taken into account, but their importance will be realized by studying the figures in Table 6.

The trials conducted at Werribee now give sufficient information to show that a mixture of meals, containing a protein supplement, and whole grain makes a very satisfactory ration for laying hens and is superior to the feeding of meals and grain without a protein supplement, or the feeding of a protein supplement with whole or soaked grain only.

Considering the amount of food consumed, rations containing a protein supplement and soaked grain are quite economical, when grain is cheap.

In Table 3, production on the various kinds of rations with the quantities fed are shown. It will be seen that birds on the usual type of ration—meals, including a protein supplement,

and grain—produced 180·4 eggs and were given 86·4 lb. of food in the year, or 4·5 more eggs and 9·9 lb. more food than those receiving a protein supplement and soaked grain only, or 6·2 more eggs and ·6 lb. less food than those receiving meal and grain only, or 7·1 more eggs and 2·5 lb. more food than those receiving a protein supplement and grain only.

TABLE 3.—AVERAGE EGG PRODUCTION AND FOOD FED PER BIRD FOR DIFFERENT KINDS OF RATIONS.

Kind of Ration.	Number of Pens.	Production per Bird. (Number of Eggs.)	Food Fed per Bird.
			lb.
Meal, protein supplement, grain	124	180·4	86·4
Protein supplement, soaked grain	8	175·9	76·5
Meal, grain	7	174·2	87·0
Protein supplement, grain	8	173·3	83·9

Substitutes for Pollard.

In Table 4 the results obtained from the feeding of substitutes for pollard are shown, and, undoubtedly, ground wheat alone or mixtures of ground wheat, oats or barley may be used with highly satisfactory results to partially or wholly replace pollard.

Two pens, both receiving free choice ground maize in addition to other ground grains, meat meal and whole grains, all free choice did very badly, and this is referred to later (see Table 6).

Eight of the sixteen pens receiving neither pollard nor ground grain received protein supplement and soaked grain only, and the other eight pens received protein supplement and whole grain only. Both of these types of rations were shown earlier to be less satisfactory for high egg production than ones containing meals like pollard or ground grains as well.

TABLE 4.—SHOWING EGG PRODUCTION AND QUANTITY OF FOOD FED ON RATIONS CONTAINING SUBSTITUTES FOR POLLARD.

Substitutes for Pollard.	Number of Pens.	Production per Bird. (Number of Eggs.)	Food Fed per Bird.
			lb.
Pollard, ground wheat, oats, barley	2	185·3	78·0
Ground wheat	5	183·1	97·2
Ground wheat, oats, and barley	13	182·8	88·0
Pollard, oat pollard, barley pollard	2	181·3	81·0
Pollard	106	179·9	86·1
Nil (no pollard or substitutes for pollard)	16	174·6	80·2
Pollard, ground barley ..	1	174·3	82·0
Ground wheat, oats, barley, maize	1	166·3	80·0
Ground wheat, barley, maize	1	151·3	76·0

Laying Sheds, State Research Farm, Werribee.

Is Bran Necessary ?

The addition of 30 per cent. of bran to the mash to give it a desirable texture is accepted as a standard practice in poultry feeding, but whether this texture is as necessary as is generally believed has not been clearly shown at Werribee.

Birds in six pens, fed on rations containing meals (without bran or brewers' grains), a protein supplement and grain, have laid as well on much less food as birds receiving bran in addition, whereas birds receiving dried brewers' grains as a substitute for bran laid an average of 1·6 eggs less and were given 9·7 lb. more food than those receiving bran. The results are set out in Table 5. Again, the sixteen pens receiving neither bran nor other meals were the pens fed soaked grain or whole grain and the protein supplement.

It is known that fowls find great difficulty in digesting fibre, and that the addition of fibre to the food increases the rate at which the food passes through the digestive system, thereby reducing the efficiency of digestion. From these trials, it appears that bran may, and that brewers' grains do, reduce the digestive efficiency of the birds, causing them to eat more food without raising egg production. As poultry foods go, bran, and more particularly brewers' grains, contain a large amount of fibre, and have food values very little better than good-quality roughages such as chaff.

TABLE 5.—SHOWING THE EFFECTS OF FEEDING BRAN AND BREWERS' GRAINS ON EGG PRODUCTION AND QUANTITY OF FOOD FED.

Substitutes for Bran.	Number of Pens.	Production of Birds. (Number of Eggs.)	Food Fed per Bird.
			lb.
Meals without bran or brewers' grains ..	6	180·1	82·0
Meals with bran ..	119	180·1	86·1
Meals with brewers' grains	6	178·5	95·8
No cereal meals, bran, or brewers' grains.. ..	16	174·6	80·2

Oats, Barley, and Maize add Variety.

Wheat grain, and wheat by-products, such as pollard, bran, and crushed wheat usually form the bulk of poultry rations, but in Table 6 it will be noticed that there are only slight variations in egg yields and the quantities of food fed for a large number of different rations where oats, barley, maize, and their by-products also have been used.

At Werribee, a grain mixture of two to four parts of wheat, and one part each of oats, barley and maize is usually fed, but when one or other of the grains has not been included in the grain mixture only slightly lower egg yields and quantities of food fed have been recorded. The dropping of oats from the ration makes the most difference in egg yield, reducing it to 175·2 eggs.

When by-products of oats, barley and maize have been used as substitutes for bran or pollard, egg yields have been maintained at about normal levels with oat and barley by-products, such as ground oats or barley, or oat or barley pollards or brewers' grains, but they have been lowered to 169·8 eggs with maize by-products, such as ground maize oil meal.

TABLE 6.—SHOWING THE EFFECTS OF FEEDING RATIONS WITH OR WITHOUT THE GRAIN AND BY-PRODUCTS OF OATS, BARLEY, OR MAIZE.

Kind of Ration.	Number of Pens.	Production per Bird. (Number of Eggs.)	Food Fed per Bird.
			lb.
Rations without grain or by-products of—			
Oats	10	175·2	82·4
Barley	16	177·2	76·0
Maize	14	176·4	81·4
Rations with grain but without by-products of—			
Oats	119	182·0	86·0
Barley	109	179·8	86·8
Maize	127	180·2	86·1
Rations with grain and by-products of—			
Oats	18	179·4	85·3
Barley	22	179·3	86·4
Maize	6	169·8	83·3

Cod Liver Oil and Minerals Unnecessary under Werribee Conditions.

Egg yields were low and food consumption high in two pens receiving 1 and 2 per cent. of cod liver oil respectively. However, the cod liver oil was fed in addition to greenstuff, which supplies adequate quantities of vitamin A. Cod liver oil, which is rich in vitamins A and D, has not been fed as a substitute for greenstuff in feeding experiments at Werribee.

In eight pens where various mineral mixtures including superphosphate, dicalcic phosphate, bone meal, potassium iodide or mixed minerals

were fed, egg production was also lower than the average, but food fed was slightly lower as well. These findings are shown in Table 7.

TABLE 7.—SHOWING THE EFFECT ON EGG YIELDS AND FOOD CONSUMPTION OF FEEDING COD LIVER OIL AND VARIOUS MINERAL MIXTURES.

Type of Ration.	Number of Pens.	Production per Bird. (Number of Eggs.)	Food Fed per Bird.
			lb.
Rations containing cod liver oil	2	170·8	95·5
Rations containing various minerals	8	176·8	83·3
Rations without cod liver oil or additional minerals ..	137	179·7	85·7

RATIONS UNSUITABLE FOR LAYING HENS.

TABLE 8.—SHOWING COMPARATIVE EGG YIELDS AND QUANTITIES OF FOOD CONSUMED BY BIRDS ON UNSUITABLE RATIONS, WITH AVERAGES FOR BIRDS ON SUITABLE RATIONS.

The Unsuitable Ration.	Pens on Unsuitable Rations.		Pens on Suitable Rations.	
	Production per Bird. (Number of Eggs.)	Food Consumed.	Production per Bird. (Number of Eggs.)	Food Consumed.
		lb.		lb.
Grain, greenstuff, and shell grit only ..	157	65	196	96
Dry mash, greenstuff, and shell grit only ..	174	92	196	96
Free choice ground grain, meat meal, greenstuff, and shell grit only ..	131	75	172	81
Wet mash, grain, soaked oats, and shell grit only	153	91	165	96
*Wet mash, grain, and shell grit only ..	156	98	165	96
Wet mash, grain, greenstuff, and quartz grit only	131	95	154	93
Wet mash, grain, greenstuff, and ground limestone only	139	95	154	93
Wet mash, grain, greenstuff only	131	95	154	93
Wet mash, grain, greenstuff, ground limestone, and shell grit ..	133	95	154	93

* In this pen 22 of the 50 birds died, and were replaced with birds receiving standard rations.

As previously mentioned, nine rations fed in the trials at Werribee were regarded as unsuitable for laying hens. The rations with the results obtained, together with the average results from the pens on suitable rations during the same trial, are shown in Table 8.

Eight of these unsuitable rations were lacking in either protein supplement and meals, whole grain, greenstuff or shell grit. The other contained ground limestone, which was not required with shell grit.

Conclusions.

Hens lay well on a large variety of different foodstuffs, rations and methods of feeding, but they must be given adequate supplies of greenstuff and shell grit.

Egg yields increase and decrease with the quantity of food consumed.

The feeding of either a wet or dry mash gives higher egg yields than the feeding of free choice meals or soaked grain.

The feeding of free choice or continuously available grain mixtures in hoppers has been more economical than the feeding of grain in the litter.

Egg yields have been highest when some food is before the birds in hoppers all the time.

Meat meal as the only protein supplement has been the most satisfactory.

The best ration is a mash containing approximately 10 per cent. of meat meal and whole mixed grain with greenstuff and shell grit.

Ground wheat, or mixtures of ground wheat, oats and barley, can be used with advantage to replace pollard.

The necessity for bran or substitutes for bran in the mash has not been demonstrated.

At Werribee, sufficient variety has been provided by the grain mixture, usually 2 to 4 parts of wheat and 1 part each of oats, barley, and maize.

Cod liver oil and extra minerals, such as phosphates, iodine, iron, &c., were unnecessary in rations comprising standard wet mash (pollard 60 per cent., bran 30 per cent., meat meal 10 per cent.) mixed grain, greenstuff and shell grit.

IN THE ORCHARD

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Spraying Peach and Cherry Trees.

DURING the months of June and July, eggs of the cherry aphid and the green peach aphid are laid on the twigs and buds of cherry and peach trees. The aphids overwinter on weeds growing adjacent to the trees, and during winter months winged forms of these insects fly to the trees and lay their eggs. Fortunately, effective destruction of eggs can be achieved by the use of tar-distillate spray at a strength of 3 gallons in 100. The spray should be applied after egg laying commences but before the buds start to swell, i.e., from late June to the end of July. Because of the severe setback suffered by *young* peach and cherry trees if they become aphis infested, these trees should receive particular attention in spraying.

The result of omitting tar-distillate spray. Left—Unsprayed, aphis-infested trees. Right—Sprayed, clean trees.

Tar distillate has a corrosive effect on the skin, and men engaged in spraying should protect their faces, hands, and arms by smearing all exposed surfaces with lanoline and by wearing goggles. Alternative materials to tar distillate are now available, and it is claimed that these are equally as effective as ovicides and are not so unpleasant to apply. Some peach growers have considered using a combination tar distillate-Bordeaux mixture spray for attacking aphis and the fungous disease "curly leaf." This spray should be applied before the buds commence to swell, in order to avoid damaging them, and it would thus be too early to provide protection against spores of "curly leaf." However, there appears to be some reason for the belief that tar distillate used alone has some fungicidal effect, but because of the value of Bordeaux mixture for control of "shot hole" and brown rot it should not be omitted on this account.

Orchard Windbreaks.

The losses which occur annually from wind damage stress the need for the growing of trees to protect orchards and citrus groves. Last season, the quality of oranges grown in northern areas was reduced through rind blemishes due to wind action, and experience shows that the small expense involved in planting trees is quickly recouped, and eventually a handsome profit is shown through the higher yields and better quality fruit obtained.

In northern areas almonds, figs, or olives may be used as windbreaks for citrus or vines, and if given some attention with regard to pruning and irrigation these trees will prove an additional source of profit. Varieties recommended as suitable for this purpose are as follow:—

Almonds.—Brande's Jordan, Chellaston, Hatch's Nonpariel, Ne Plus Ultra, I.X.L. The first two, or two of the last three, should be planted together for cross pollination.

Figs.—Black Genoa, Brown Turkey (dessert varieties); White Genoa, White Adriatic, Cape White (jam varieties); Smyrna (drying, requires pollination by wasps from the Capri fig).

Olives.—Manzanillo, Mission, Correggiola, Bouquettier.

For rapid establishment, a windbreak of sugar gums (*Eucalyptus cladocalyx*) provides effective shelter. If planted on their own they should be pollarded to a height of 8 to 10 feet after they have grown 30 to 40 feet high. This will induce a bushy regrowth, otherwise interplanting of pepper trees (*Schinus molle*), or lucerne trees (*Cytisus proliferus*) should be made.

Sugar gums are satisfactory also for the moister conditions in southern districts. Mahogany gum (*E. botryoides*) is another eucalypt which may be used. Most satisfactory in southern areas are cypresses such as Monterey cypress (*Cupressus macrocarpa*) planted 15 to 20 feet apart, *Cupressus Lambertiana horizontalis*, planted 25 to 30 feet apart, or the common pine, *Pinus radiata*, planted 15 to 20 feet apart.

In planting a windbreak the chief object should be to establish a row of healthy, vigorous trees which will grow quickly to a height sufficient to protect the vines or fruit trees. In the early stages it is necessary, therefore, to control weed growth around the trees, and, in the northern districts particularly, to irrigate the young trees during the summer so that they will become strongly established.

In addition to their usefulness in providing shelter from the wind, trees add to the value and beauty of a property.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

IT will soon be time to make plantings of annuals, and the beds for these should be prepared this month. Thoroughly dig the beds and bury a liberal amount of well-rotted manure, or plant refuse, adding blood and bone manure at the rate of 2 oz. per square yard. If the soil is very acid, apply finely ground agricultural lime, or wood-ashes at the rate of about 4 oz. per square yard. At this time of the year the digging is left rough, and the lime or wood-ashes is spread evenly over the surface. This treatment will improve the tilth of heavy, sticky soils, but it is very important also that a large amount of organic matter should be dug into such soils to make them more friable.

Perennials.

If clumps of perennials have grown too large, they should be lifted, divided, and replanted. Many gardeners prefer to have portions of their gardens devoted to perennials, because much less labour is required to maintain these plants.

Perennials occupy an intermediate place between annuals and shrubs as far as the amount of work is concerned. Among the popular perennials are delphiniums, perennial phlox and daisies, irises, cannas, penstemons, lupins, aquilegias, campanulas, Canterbury bells, chrysanthemums, geums, heuchera, helenium, lychnis, armeria and rudbeckias.

It is better to delay the lifting and division of delphiniums until the young shoots are about 3 inches high. If this is done, it will be found that losses due to rotting are reduced. Divide the clumps so that at least three shoots are left in each clump and remove any weak, spindly shoots. Replant so that the top of the crown is about 1 inch below the soil level.

Snails and slugs are very bad pests of the delphinium, and the young shoots should be protected by a sprinkling of sharp cinders around each crown, or by suitable baits.

Rhododendrons.

Rhododendrons are increasing in popularity, and in spring their showy trusses of bright flowers brighten the half-shady spots of the garden. These plants may be planted this month, but it is advisable to choose a well-drained, semi-shady position protected from hot north winds and afternoon sun. They like plenty of humus, and this can be supplied in the form of leaf mould. A cool, moist, root-run and absence of lime will be found beneficial. Blood manure may be used to advantage with rhododendrons. There are many very fine varieties available in the following colours:—

Crimson.—Hugh Koster, John Walter, Ascot Brilliant, Michael Waterer, Mrs. P. den Ouden, Brittania, Doncaster, Sir Robert Peel, and William Austin.

Pink.—Goldsworth Pink, Hugh de Vries, Pink Pearl, Pink Perfection, Pink Beauty, Lady Dorothy Neville, and Mrs. C. B. van Nes.

Dark-red.—J. G. Millais, Lord Roberts, B. de Bruin, Robert Croux.

White.—Alarm (edged with carmine), Gomer Waterer (faint blush), Duchess of Portland, and Sweet Simplicity (pink edging).

Trees and Shrubs.

Planting of both deciduous and evergreen trees and shrubs can be done this month and, if necessary, it is a good time to move plants to another situation. If the plants are large, lift them with a good ball of earth adhering to the roots and cut back the tops to compensate for the loss of portion of the root system.

Pruning.

Complete the pruning of roses, hydrangeas, &c., but do not prune the flowering fruit trees and lilacs until after flowering.

Gladioli.

The first planting of gladioli corms may be made towards the end of the month. Gladioli are sun-loving plants, and do best in a bed by themselves. In light soils, plant the corms 5 inches deep, and in heavy soils about 3 inches deep and 6 to 9 inches apart, in rows 18 inches to 2 feet apart. If manure is to be applied before planting, it should be well-rotted and placed 3 inches below the corms and covered with soil. Before planting, all corms should be cleaned and dipped in a solution of corrosive sublimate, at a strength of 1 oz. to 6¼ gallons of water, to which is added ½ oz. of common salt. Soak in this solution for ten to twelve hours. This is a very poisonous mixture, and care should be observed in its use. Make the solution in an earthenware or glass container, because, as its name suggests, it is corrosive.

THE VEGETABLE GARDEN.

Peas and Broad Beans.

The climate and soil are too cold for planting anything but the hardy vegetables this month. Another sowing of broad beans may be made and also green peas. Greenfeast and Melbourne Market are popular varieties of green peas for planting now. Dig the soil deeply and apply a liberal dressing of superphosphate—about 2 oz. per square yard. Do not place the manure in the drill-row with the seed. Rows can be spaced 2 feet apart, and seed should be set 2 inches apart and at least 1 inch deep.

The seed is sown most conveniently by opening a row or drill with the hoe or the end of the rake handle, running the seed along the furrow and then raking the soil over it. A good plan is to firm the seed by gentle pressure before covering it.

The germinating seed often requires protection from birds because of their fondness for young green growth. A piece of old bird wire netting over he row usually gives sufficient protection.

Cabbages.

Seed of Early Flat Parisian cabbage may be sown now in a seed bed in a warm position. Plants then should be ready for planting out in August or early September. Cover the seed with about half an inch of sieved soil.

Carrots and Parsnips.

Towards the end of July, the first sowings of carrots and parsnips may be made. These, like the other root crops, are sown in rows, where they are to remain. Use fresh seed and sow about half an inch deep. Thin sowing will save time in thinning later.

In cold, wet soils, it is advisable to postpone sowing carrots and parsnips until the warmer weather.

Silver Beet and Lettuce.

Plants of silver beet, either "Lucullus" or "Fordhook Giant" variety, and lettuce, "Mignonette" or "Green Mignonette" variety may be put in now. These two varieties of lettuce are suitable for the home garden, but are too tender in the leaf for the market garden.

Tomatoes.

Tomato seed may be sown in boxes or in frames where they are protected from frost. Of the flat corrugated types, Bendigo Large Red, Burwood Wonder, and Orange Prolific are the most popular. Red Marhio, Eccles Surprise, Walker's Recruit, Potentate, Salad's Special, and Kondine Red are liked because of their smooth round fruits.

Save, and Lend your Savings to the Nation!

The Gooseberry Weevil

(*Ecrizothis inaequalis* Blkb.)

By
T. W. HOGAN, B.Agr.Sc.,
Assistant Entomologist

THE gooseberry weevil is a native insect normally living on indigenous plants such as Dogwood (*Cassinia*) and Daisy Bush (*Olearia*). It does no serious damage to these plants beyond eating into the edges of the leaves. First described in 1899 by Blackburn from Victorian specimens, its distribution seems to be confined to the southern half of this State. This weevil has become of economic importance by its habit of attacking certain introduced plants, including the gooseberry and raspberry, in some Victorian berry-growing districts.

Damage.

The killing out of an area of first-year raspberries by the gooseberry weevil has been observed by the author, but the gooseberry is the only crop plant attacked by this pest to any great extent. Serious loss of crop occurs when the adult weevil feeds on the young buds just as they are opening, and thus prevents the production of fruit. This occurs in seasons favorable to the early emergence of the weevils.

In other seasons, the weevil does not reach the bush until the young shoots are several inches long. It eats into the stems of these shoots causing them to break off or dry out (Fig. 1). New shoots are produced by the plant to replace those destroyed. Over a number of years this may affect the health of the plant, but will not affect the current crop. In addition, the larvae feed on the roots, and this may cause more damage to the plant than the feeding of the adult weevil on the leaves.

Description.

The gooseberry weevil (Fig. 2) is approximately one-fifth of an inch in length, grey to brown in colour, with the typical "snout" of the weevil family. Wings are present, but functionless, and the insect depends on crawling or accidental transport for its distribution. The only apparent external difference between the male and female is that the female usually is larger.

The larva lives in the soil. It is a white, legless grub with a brownish head, and is about ¼ inch long when fully grown (Fig. 3).

Life History.

In the larval stage, the insect overwinters in the soil on the roots of the plant down to a depth of 1 foot. With rising temperatures in early spring, these larvae make their way to within about 3 inches below the surface of the soil, where they form small earthen cells in

Fig. 1.—Showing damage to young shoots of the Gooseberry bush caused by gooseberry weevil.

which they pupate—pupation lasting about three weeks. When the adult emerges, it makes its way to the surface and climbs up into the gooseberry bush. Pupation of all the larvae

Fig. 2.—Adult gooseberry weevil (enlarged).

does not occur simultaneously. The emergence of the weevils takes place over a period of approximately six weeks, which adds to the difficulty of obtaining effective control.

For a period of four to six weeks the adult feeds voraciously on the young buds and new shoots which are then growing rapidly. Feeding occurs at night, but most of the weevils hide on the bush during the day. However, if the bush is disturbed, they quickly drop to the ground where they feign death, and might be taken for part of the soil. Migration from one bush to another occurs to some extent, but the weevils do not travel far unless food is scarce.

Egg-laying commences towards the end of November. The eggs are laid in the surface layer of the soil. They are elliptical in shape, white at first, but turn black after a few hours. The young larvae hatch out after several days, and immediately burrow into the soil, where they feed on the roots of the host plant. They remain in the soil until the following spring, when the life cycle is recommenced.

Control Measures.

Experiments conducted in areas where this pest is prevalent show that the most satisfactory control is obtained by means of a spray of lead arsenate paste 10 lb. (or 5 lb. of powder) to 80 gallons of water, to which is added 1 pint of white spraying oil. This spray should be applied when the weevils first make their appearance, or when the first green shoots appear on the plant, and again about three weeks later. As most of the damage is done to the stems of the young shoots, particular care should be taken to ensure that the spray reaches these parts of the plant.

Dusting with a 50 per cent. lead arsenate dust will give satisfactory control when applied as recommended for the spray, but it is not as effective as the latter.

Fig. 3.—Larva of the gooseberry weevil (enlarged).

LIVE STOCK NOTES—*continued from page 366.*

In most districts the budding for the coming season is normal, and areas which produced a fair yield of honey last season are again promising. Much of the redgum in the North-East is suffering badly from foliage diseases, whereas adjacent areas are unaffected.

Due mainly to war conditions, prices of honey and beeswax are somewhat higher than normal. Honey is worth from 5d. to 7d. per lb., in comparison with 2d. to 4½d. per lb. in May, 1938. The present price of beeswax is 2s. 6d. per lb., whereas in May, 1938, it was 1s. 3d. to 1s. 4d.

[J. W. Thomlinson and W. A. Collins, Apiary Inspectors.]

By RACHEL M. PEILE, Fruit Preserving Expert

AN assortment of marmalades can be prepared from the several varieties of citrus fruits available in the season. These fruits are at their best for marmalade during the months of June, July, and August.

Certain kinds of oranges, such as Seville, Pomelo or Grape Fruit, Poorman, and others of the sour variety (usually called "jam" oranges) are mostly favoured, although some people prefer to use the sweet kinds, as Navel, Valencia, &c., chiefly because of the mild flavour. All varieties, however, are suitable.

The "jam" oranges will give a more attractive product, and also a bigger quantity, than the sweet varieties, because the former will take one quart of water to each pound of fruit and the white pith on these oranges will boil clear, whereas the sweeter varieties will take one pint of water only to each pound of fruit and the white pith will not boil clear.

Lemons also make a very nice marmalade, of a mild flavour. A quart of water may be used for each pound of lemons, but the white pith will not boil clear.

A really good marmalade should be tender in texture, and when cut with a spoon should be just firm enough to retain its shape, and also present a sparkling appearance where cut. It should not be thin enough to be "syrupy," nor should it be tough. The pieces of peel should not be the least bit hard, and should be evenly distributed throughout the mixture.

Utensils.

In making marmalade, it is best to use a pan of medium size, with a broad surface and straight sides, and fitted with a lid. If a lid is not available, an inverted enamel bowl, wooden paste board or tray will serve the purpose. An aluminium pan is very suitable, being light in weight and easy to clean. The metal conducts the heat rapidly to the top of the pan, allowing the contents to become more readily heated. Any other kind of preserving pan could be used. For cutting or slicing the oranges, there are different types of small machines and cutters on the market and these simplify the work, although a well-sharpened knife will give equally good results. It is always advisable to wipe frequently the cutting blade either of knife or machine while in use, otherwise the clean skin will become discoloured with the stained juice on the blade.

Selection and Preparation of Fruit.

For any of the marmalades, select fruits even in colour, and free from skin blemishes. Some prefer the deep and others the pale skins. The fruit should be scrubbed, as washing alone will not remove all the dust, and this is one of the causes of a cloudy marmalade.

The underlying principles of marmalade making are the same as for jam making, but the peel of citrus fruit requires a longer time to cook than the skin of softer fruits, more water has to be added, in order to cook the peel and the boiling has to be continued for a much longer period. The pectin in citrus fruits is to be found in the white inner skin or pith. The acid is present in the juice, and bitterness lies in the little oil cells between the white pith and the skin. If it is desired to remove the bitterness this can be done easily by soaking either the whole orange or the cut peel in two or three changes of fresh cold water for several hours, or overnight. The pectin has to be brought into solution before a jellied marmalade can be made. The more thinly the peel is cut, the more readily will this occur.

Method of Making.

Thoroughly cleanse and weigh the fruit. Halve each orange and remove the centre core or rag, which should be rejected as it will not boil clear and spoils the appearance of the finished product by appearing throughout in little thick white lumps. Then quarter the fruit and tear out the pulp, as the dry skin is much easier to shred than the whole orange. Cut the skin as finely as possible and allow to soak overnight in an enamel or earthenware bowl, covering the peel with water.

Next day, add the finely-cut pulp and the given quantity of water, using the water in which the peels have soaked, or discarding it if "bitterness" is not desired. If the "jam" oranges are being used, allow one quart of water to each pound of fruit, and if the sweet kind, use one pint of water only to each pound of fruit. Simmer all together in the preserving pan, with the lid on, until all the peels are cooked, stirring very gently and only occasionally, so that the pieces of shredded peel will not be broken. This should take about three-quarters of an hour.

Then measure by cup and add equal measure of sugar. When the sugar has quite dissolved, boil the mass rapidly without the lid on the pan, skimming if necessary until the setting stage is reached. This may be ascertained by dipping the stirring rod into the mixture, then holding it up horizontally on its side and watching the drops as they fall. If the marmalade is ready for bottling, these drops will fall heavily in sheets or flakes.

Prolonged boiling of the marmalade after the sugar has been added should be avoided, for it not only spoils the flavour and darkens the colour, but also affects the pectin contained in the fruit, and causes loss of the jellying properties. If the boiling mass is watched carefully, and testing begun as soon as it begins to rise in the pan, this will lessen the likelihood of the marmalade being overboiled. The time taken for the "setting" stage to be reached varies with the seasons, but is usually between 20 to 40 minutes after rapid boiling has commenced.

When the setting stage has been reached, lift the pan from the fire and allow the contents to cool very slightly before bottling, for about three or four minutes. If the marmalade is bottled too hot, the pulp will rise to the top of the jar, leaving clear jelly at the bottom. Have the jars or containers thoroughly clean and dry. If glass jars are being used, bind them round with a piece of damp cloth while pouring the hot marmalade into them. Allow them to get quite cold before sealing.

Marmalade for Exhibition Purposes.

The method for making marmalade for exhibition purposes differs from that previously described, in that the pulp need only be cut roughly and is then tied in a piece of cheesecloth which is placed in the pan with the finely cut peels, and water. When the peels are cooked and the sugar is to be added, the bag of pulp is removed. In this way the goodness is drawn from the pulp, but the finished product is a clear jelly with the peels evenly distributed throughout.

Marmalade for Kitchen Use.

In some homes, particularly where marmalade is used to any extent in conjunction with baked or steamed puddings, or in pastry, &c., a very effective and quick way to prepare a quantity for the purpose is to pass the orange skin through the mincer. This saves much time in cutting, and gives an even grain through the mixture, which makes it very suitable for cooking purposes.

When this method is adopted the orange should be first quartered, then the skin and pulp separated. It is the skin only which is passed through the mincer. The juicy part of the orange may be cut up and added, together

with one and a half pints of water to each pound of orange used; then make in the usual way. When making this particular kind of marmalade one must be sure that the pieces of skin are quite tender before the sugar is added, otherwise the finished product has a tendency to harden with keeping.

Orange Peel Marmalade.

This recipe is a very economical one, as it utilizes the peels from sweet oranges, which are usually discarded—

2 cups finely-cut peel,
2 medium lemons,
2 pints water,
2¼ lb. sugar.

Soak the peels in water overnight. Next day add the strained lemon juice and simmer, with the lid on the pan, until cooked, then add the sugar. When thoroughly dissolved, boil rapidly till the setting stage is reached. The lemon peel may be cut finely and cooked with the orange peel, or the half pieces may be put in and removed when the sugar is added .

Cumquat Marmalade.

2 lb. cumquats,
2 quarts water,
1¾ lb. sugar.

Clean the cumquats with brush and water. Cover them with scalding soda water (¼ cup of bi-carbonate of soda to 2 quarts of water) and allow them to stand for 5 minutes, then rinse two or three times in clear water. Cut the cumquats in slices, removing the seeds. Boil the fruit in the given quantity of water for ¾ to 1 hour, with the lid on the pan, then add the sugar. Boil rapidly, removing the lid until the marmalade sets.

Marmalade for Diabetics.

(Advised by Melbourne Public Hospitals.)

1 orange (large), peel and flesh,
1½ lemons,
5 saccharine tablets,
5 oz. water,
¼ oz. gelatine.

Wash fruit. Pare off rind thinly, avoiding white pith. Shred rind finely. Slice flesh of lemons and orange thinly. Put fruit rinds and water in saucepan and simmer for 2 hours. Make up the amount of water lost in evaporation. Soak the gelatine in a little water, then add it to the jam and boil the jam for 10 minutes longer. Just before taking off the fire, add the saccharine. *Do not boil saccharine.*

Lemon Marmalade.

(Using Half Quantity of Sugar.)

2 lb. lemons,
2 quarts water.

Clean the lemons, shred the skins finely and put them to soak overnight in cold water. Next day cook the peels and the cut pulp gently in the given amount of water for 1¼ hours, keeping the lid on the pan. Measure the mixture by cup and add sugar according to half the number of cups. Allow the sugar to dissolve, then boil the jam rapidly for 40 minutes. Bottle and seal. This quantity will make approximately 2¼ lb. of marmalade.

Faults in Making.

Tough skins are caused by insufficient cooking before the addition of sugar.

Risen pulp—due to bottling while too hot.

Sticky, syrupy marmalade is caused by over-cooking.

Thin, liquid marmalade is caused by insufficient cooking.

Punctured Wounds in Horses' Feet.

Punctured wounds in horses' feet usually are caused by a nail or other hard object penetrating the sole of the foot.

If noticed when freshly done, the wound should be throughly disinfected with Tincture of Iodine and kept clean.

If not properly attended to at first, pus may form between the sensitive and horny sole and cause acute lameness. Often at this stage the situation of the puncture is difficult to find. To locate the spot the foot should be gently tapped with a hammer or tried with a pair of open-mouthed pincers. When found, the sole over the sensitive part should be thinned with a farrier's knife until it will flex by pressure of the thumb. Then open the abscess and cut away all under-run portions of the sole. Thoroughly clean with any reliable antiseptic and dress with Tincture of Iodine, later plugging with clean tow or lint soaked in the Iodine.

Cover with a pad of clean tow or lint and bandage to keep out dirt, &c.

Certified Pullorum-free Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Number.	Owner.	Date of Certification.	Number of Birds.
1	Reformatory Prison, Castlemaine	6th March, 1942	200
2	"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26th March, 1942	927
3	Stewart, J. A., Castlemaine	22nd April, 1942	592
4	Rushton's Electric Hatcheries (J. Rushton), Shepparton	28th April, 1942	653
5	Christie, R. R., and Son, Bentleigh	1st May, 1942	719
6	Becker, F. W., Cheltenham	1st May, 1942	315
7	Kostos, D., Cr. Collins and Waverley-roads, Oakleigh, S.E. 12	11th May, 1942	801
8	Evans, R., 50 Simpson-street, Kyneton	11th May, 1942	35
9	Throup, R. E., Neerim South	11th May, 1942	200
10	Berry, R., Campbell's Creek	11th May, 1942	87
11	Flack, Mrs. Florence, Horsham	11th May, 1942	100
12	Need, H. G., Warragul	15th May, 1942	254
13	Smith, R. Harcourt	15th May, 1942	97
14	Dookie Agricultural College, Dookie	19th May, 1942	447
15	Pettigrove, D. N., Kennington, via Bendigo	19th May, 1942	558
16	Wohlers, S., Jung	21st May, 1942	139
17	Throup, N. C., Neerim South	21st May, 1942	67
18	Mair, W. P., Tyabb	21st May, 1942	38
19	Horsfall, J. B., Lower Templestowe	26th May, 1942	720
20	Smith, F., Terang	1st June, 1942	947
21	San Miguel, Mrs. M. H., Box Hill	1st June, 1942	1503
22	Rae, J., Sebastopol	1st June, 1942	1497
23	Bartlett, O. E., Pimpinio	1st June, 1942	228
24	Cakebread, H., Shady Creek, via Buln Buln	3rd June, 1942	112
25	Simpson, G. D., Tally Ho	3rd June, 1942	680
26	Clark, H. N., Croydon	8th June, 1942	1411
27	Abernethy, F. J., Horsham	8th June, 1942	368
28	Heath, A. L., Spring Vale	8th June, 1942	130
29	Lowe, L. S., Bayswater	8th June, 1942	241
30	Youl, R. S., Wedderburn	8th June, 1942	757
31	Hewett, A., Bayswater	8th June, 1942	247
32	Thomas, Mrs. J., Outtrim	8th June, 1942	100
33	Barnes, J. H., Blackburn	8th June, 1942	978
34	Wimhurst, C. J., Tongala	8th June, 1942	417
35	Williams, V. (Wangaratta Hatchery), 91 Tone-road, Wangaratta	12th June, 1942	568
36	Kosch, E. W., Minyip	12th June, 1942	343
37	Mumford, L. J., Healesville	12th June, 1942	252
38	Broadbent, C. A., Yarraberb, via Derby	12th June, 1942	193
39	Massie, G., Shepparton	12th June, 1942	1309
40	Shipp, R., Kerang	12th June, 1942	375
41	Hopkins, C. A., Shepparton	12th June, 1942	1348
42	Hunt, R. R., Burwood	19th June, 1942	300

DO YOUR BIT! BUY WAR SAVINGS CERTIFICATES

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69	Longerenong Agricultural College	Dooen	43
Banyule Stud Pty. Ltd.	Wangaratta ..	42	McNabb and Son, G. A.	Irrewillipe East ..	177
Black, I. S., Estate ..	Mount Noorat ..	52	Onley, W. H. ..	"Glenholme," Caldermeade	50
Clarke, A. B. ..	Glenormiston South	16	Payne, A. E. T. ..	"Yarra View," Lilydale	63
Dennis, Mrs. A. A. ..	Frankston.. ..	33	Payne, T. E. N. ..	"Woodburn," Kilmore	46
Dookie Agricultural College	Dookie	77	Powell, T. S. ..	"Carellen," Mansfield	46
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Geelong Grammar School	Corio	56	Samuel, Misses G. and E.	Lang Lang ..	48
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29	School of Horticulture	Burnley	9
Gorman, A. W. ..	"Cathcart," Alexandra	61	State Experiment Farm	Rutherglen ..	40
Holloway, R. W. ..	Caldermeade ..	70	State Research Farm	Werribee	229
Kilmany Park Farm Home for Boys	Sale	94	Wells, W. G. ..	Caldermeade ..	65
Lawrence, P. H. ..	"Rainga," Tarrawarra	72			

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43	Clark, P. W. ..	Whittlesea ..	62
Andrew, J. C. ..	Whittlesea ..	121	Clements, M. and L., and Son	Bundoora	135
Andrew, W. ..	Whittlesea ..	160	Cobain, J.	Thomastown ..	40
Andrews, E. H. ..	Templestowe ..	19	Collins, L.	Doreen	74
Balharrie, J. A. ..	Whittlesea North ..	59	Cornfoot, D. H. ..	Whittlesea ..	25
Barclay, A. H. ..	Whittlesea ..	107	Cotchin, J. ..	Woodstock	18
Barling, J. ..	Mernda	39	Coulthard, J. J. ..	Whittlesea ..	66
Batten, R. J. ..	Wollert	44	Cox, E. H. ..	Lower Templestowe	37
Bebbington, J. ..	Whittlesea ..	92	Craker, Mrs. E. ..	Warrandyte ..	2
Benson, R. ..	South Morang ..	28	Cumming, H. R. ..	South Morang ..	20
Booth, Mrs. A. ..	Warrandyte ..	8	Danaher, J. V. ..	Whittlesea ..	63
Bourke, G. J. ..	Fairfield	82	Danns, N. C. ..	Whittlesea ..	34
Bradbury, A. K. ..	Diamond Creek ..	31	Dennett, C. A. ..	Cragieburn ..	38
Buckley, F. J. ..	Mernda	104	Deutscher, H. W. ..	Mernda	168
Bunting, J. ..	Epping	35	Deveny, M. ..	Bundoora	51
Callaghan, L. ..	Epping	34	Drysdale, J. C. ..	Warrandyte ..	37
Callaghan, T. F. ..	Thomastown ..	40	Evans, Miss M. ..	Bundoora	29
Child, G. P. ..	Epping	53	Fellows Bros. ..	West Heidelberg ..	52
Christian Bros. ..	Doreen	41			

TUBERCLE-FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name	Address.	Number in Herd at Last Test.
Fergusson, M. A.	Whittlesea	92	Norton, O. G.	Bundoora	37
Fitzsimons, B.	Lower Templestowe	30	O'Hern, T.	Epping	58
Fox, A.	Mernda	59	O'Loughlin, W. L.	Epping	27
French, T. W.	Wollert	43	Parker, Mrs. A. E.	Greensborough	24
Gallus, E. A.	Doncaster	11	Pentland, C. V.	Templestowe	17
Gardiner, C. E.	Epping	20	Pettit, W. H.	Thomastown	36
Gibbs, C.	Arthur's Creek	28	Pitson, R H.	Yarrambat	17
Graff, Mrs. M. G.	Mernda	24	Player, A. D.	Epping	42
Graham Bros.	Whittlesea	71	Power, L. J.	Mernda	52
Green, W.	Mernda	11	Quinlan Bros.	Epping	49
Hall, J. E., Mrs.	Whittlesea North	13	Raper, L. R.	Greensborough	36
Hancorne, Miss M. R.	Yan Yean	27	Rawlings, J. H.	Whittlesea North	41
Harding, J. E.	Templestowe	42	Righetti, L. A.	Lower Templestowe	40
Hardwick, A. E.	Epping	35	Robson, Mrs. G. A.	South Morang	47
Hargreave, Mrs. E. J.	Whittlesea	21	Rodgers, E.	Whittlesea North	11
Harkness, H. J.	South Morang	31	Rosewarne, Miss P.	Yan Yean	43
Harmer, R. E.	Wollert	38	Ross, A.	Templestowe	5
Hawkes, Miss D.	Warrandyte	19	Salcki, S.	Thomastown	51
Hehr, H.	Epping	32	Seeber, B.	Thomastown	24
Hehr, R.	Wollert	23	Shanks, John	Mernda	73
Herd, J.	Epping	41	Sheeky, A. A.	Templestowe	14
Hewitt, C. J.	Wattle Glen	8	Short, E.	East Preston	99
Higgs, R. N.	Yan Yean	76	Siebel, F.	Thomastown	26
Hobbs, Mrs. F. J.	Doncaster East	6	Skals, P.	Rosanna	28
Hobbs Bros.	Heidelberg	65	Smirfitt, J. E.	Epping	39
Howden, A.	Epping	29	Smith, G. A.	Templestowe	63
Howell, G. G.	Wollert	221	Smith, J. R.	Mernda	34
Hughes, J.	South Morang	1	Smith, L. McA.	Yan Yean	2
Jackson, Mrs. M. A.	Heidelberg	7	Smith, L. W.	Bundoora	73
Jenkins, T. H.	Whittlesea	24	Smith, P. A.	Ivanhoe	2
Johnstone, J. A., Miss	Mernda	14	Smith, R. A.	Epping	27
Jones, A. J.	South Morang	30	Smith, R. J.	Epping	54
Jukes, C.	Epping	39	Smith, S. E.	Epping	31
Jukes, W. H.	South Morang	35	Southon, H. W.	South Morang	27
Junor, G. M.	South Morang	37	Stephens, H.	Epping	48
Kell, W. E.	Greensborough	21	Stimson, T.	Woodstock	33
Lay, P.	Alphington	30	Tarry, J.	South Morang	24
Loft, A. H.	Wollert	52	Thomas, W. C.	Yan Yean	31
McCormack, D.	Woodstock	33	Towt, C. W.	Glenvale	136
McDonald, A. J.	Whittlesea	2	Trethowan, F. W.	Donnybrook	94
McDonald, J.	Templestowe	20	Vallence, C. A.	Epping	11
McDowell, R. H.	Greensborough	28	Van, E. L.	Templestowe	28
McGregor, W. B.	Mernda	41	Walsh, J. B.	Templestowe	11
McKendry, J.	Doreen	47	Whelpton, B.	Whittlesea North	59
McKernan, A. H.	Whittlesea	24	White, W.	Greensborough	18
McKie, J. W.	Wollert	83	Whittingham, E. W.	Greensborough	40
McLean, J. F.	Bundoora	32	Williams, E. A.	Thomastown	33
McPhee, K.	Whittlesea	116	Williamson, J.	Doncaster (High-street)	5
McPherson, A.	Yan Yean	64	Wilson, J. E.	Diamond Creek	35
Mann, W. J. and K. W.	Thomastown	108	Wilson, Mrs. M.	South Morang	14
May, Mrs. M.	Warrandyte	5	Wood, A. V.	Yan Yean	125
Mays, Mrs. A. M.	Doncaster	5	Wrest, W.	Epping	76
Merriman, J.	Diamond Creek	17	Wuchatsch, A.	Epping	29
Miller, A. J.	Whittlesea North	47	Wuchatsch, J. D.	Epping	14
Miller Bros.	Greensborough	36	Yann, R.	Wollert	52
Mosig, H. C.	Epping	24	Young, Mrs. A.	Wollert	33
Nalder, H. S.	Epping	20	Ziebell, H.	Thomastown	32
Nebel, Mrs. A. E.	Thomastown	38			

There are also 93 herds in which 4,234 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Contents.

AUGUST, 1942

		PAGE.
Pasture Investigations—Results of 1941 Trials ..	*W. D. Andrew, M.Agr.Sc.*	385
More Potatoes are Needed—Advice on Growing	*J. T Ramsay*	393
Fodder Conservation Competition—Cohuna District ..	*A. Morgan, B.Agr.Sc.*	400
Fertilizer Rationing		404
Navy Beans		405
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	407
Hay and Silage Making	*A. C. T. Hewitt, M.Agr.Sc.*	412
Brucellosis-free Herds (Swine)		417
Seasonal Diseases of Sheep—Pregnancy Toxaemia and Hypocalcaemia	*H. M. Elder, B.V.Sc.*	418
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	421
Garden Notes	*J. L. Provan, B.Agr.Sc.*	422
Vegetable Planting Guide	*F. A. Maher, B.Agr.Sc.*	424
Vegetable Drying	*Rachel M. Peile*	437
Pullorum-free Flocks (Poultry)		438
Tubercle Free Herds		439

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

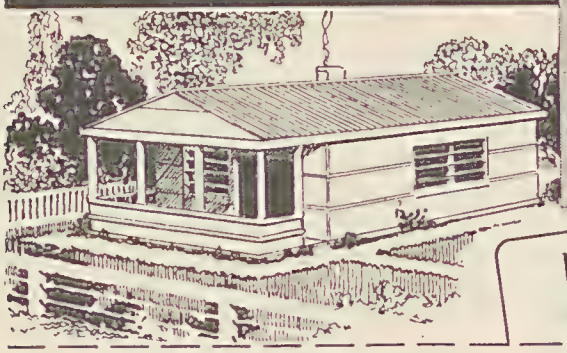
The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions, 2½d.; to U.S.A. and Foreign Countries, 3½d.

Plan farm buildings for ECONOMY with HARDIE'S GENUINE FIBROLITE

ASBESTOS CEMENT BUILDING SHEETS



New erections or additions to existing farm buildings can be carried out with Fibrolite Asbestos Cement Building Sheets at bed-rock cost. Any handy man can erect Fibrolite, and the modern Fibrolite Horizontal Mould ensures attractive designs.

MAIL COUPON FOR ILLUSTRATED BOOKLET

PLEASE SEND FREE FIBROLITE BOOKLET

*NAME*_____

*ADDRESS*_____

JAMES HARDIE & COY. PTY. LIMITED
Cor. CITY ROAD & CLARENDON ST.
South Melbourne, S.C.5 (Phone MX4727)

INDEX TO ADVERTISEMENTS

FRONT SECTION

General Motors-Holden's Pty. Ltd. ... opp. p. 393

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi

Hardie James & Co. Pty. Ltd. ii

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. v

Law Somner Pty. Ltd. (Seeds) ... opp. p. 392

Leggo, Victor, & Farmers Ltd. ... inside cover

BACK SECTION

Australian Barley Board (Barley Prices) ... ... opp. p. 433

Australian Cement Ltd. ... ... inside cover

BACK SECTION—*continued.*

Cockbill, J. vii

Commonwealth Serum Laboratories outside cover

Jeyes Fluid vii

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 432

Nightingale, A. G. & Co. (Nursery Stock for sale) vii

State Savings Bank viii

Trewhella Bros. Pty. Ltd. vii

Trinca Stud Poultry Farm (chicks, pullets for sale) vii

Victorian Railways viii

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) ... ... opp. p. 433

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

PASTURE INVESTIGATIONS

Results of 1941 Trials

Extracts from the Tenth Annual Report on the Pasture Experimental Work conducted by the Department of Agriculture for the Victorian Pasture Improvement League

By W. D. ANDREW, M.Agr.Sc., Assistant Agrostologist

IN 1931 a scheme of pasture experimental work involving the establishment of numerous pasture plots throughout the State was initiated by the Victorian Pasture Improvement League with the object of providing further information in regard to methods of pasture improvement in Victoria.

The Department of Agriculture agreed to carry out this work for the League, and the experiments undertaken are of two main types. One entails the trial of various pasture plants with the object of determining their suitability for various conditions of soil and climate, while the other is concerned with the determination of the manurial requirements of pastures in various parts of Victoria.

Seasonal Conditions for 1941

Southern Victoria experienced favourable conditions for pasture growth during 1941 and most of the Western District had one of the best seasons on record.

Mowing Manurial Trial in the Western District.

In the Northern country, however, although heavy rains were fairly general in January and March, dry conditions supervened, and this spoilt the chances of a good season. The central and western portions had an exceptionally poor autumn and winter, while in the eastern part, growth during this period was not good. Hand feeding of stock became necessary by May in many of the Northern districts. Timely rain in July prevented the development of drought conditions in many parts of the north, but the feed soon dried off with the onset of the warm weather. The spring in the North-East was fair only. In the Western District and in parts of Gippsland there were excellent opportunities toward the end of the season for the conservation of fodder, but a scarcity of labour made it difficult to undertake this work. Elsewhere there was little surplus growth in the spring.

MANURIAL TRIALS, NON-IRRIGATED PASTURES

In these trials information on the manurial requirements of soils is obtained by top-dressing pastures with various fertilizers and lime, either alone or in combination, and noting the responses to these applications.

At many of the plots the areas under trial are not more than two to three square chains in area and are fenced off from stock. Within these areas, long narrow strips are variously treated; each treatment is replicated to increase accuracy, and the responses to the applications of fertilizers are measured by mowing the strips with a lawn mower at frequent intervals and weighing the clippings from each strip separately. The mowing and removal of pasture clippings is an exhaustive practice, and if carried out regularly, soon reveals which of the elements are most easily depleted and therefore, which ones are likely to become limiting factors to pasture growth under faulty management.

An alternative to the mowing technique for determining manurial requirements is to differentially top-dress narrow strips or small paddocks that are grazed by stock in a normal manner and to keep a careful record of the behaviour of the pasture species under the various manurial treatments. With this method it is difficult to obtain any quantitative record of the responses to fertilizers, but it is most useful in conjunction with mowing manurial trials.

TABLE 1.—MANURIAL TRIAL AT GLENORMISTON NORTH—(K. ATKINS)

Total Annual Yields in Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca.20.	P2. N1. K1.	P3.	Total Production.
1932	155	174	176	187	176	177	1,045
1933	115	134	137	145	143	134	808
1934	257	336	267	279	278	339	1,756
1935	243	284	242	250	303	281	1,603
1936	166	222	217	214	274	224	1,317
1937	120	153	153	154	198	160	938
1938	44	64	70	77	94	68	417
1939	172	230	217	224	282	231	1,356
1940	52	64	75	76	105	64	436
1941	132	158	159	160	294	147	1,050
10 years' total	1,456	1,819	1,713	1,766	2,147	1,825	10,726

The figures for yield given in this report have all been obtained with the motor-mower and they are expressed in cwts. of greenstuff per acre for convenience of interpretation. As a rough

approximation, the equivalent yield of air dried hay may be obtained by dividing the green-weight figure by four.

To simplify the arrangement of the tables certain abbreviations have been used throughout. "P." represents superphosphate, "N." sulphate of ammonia, "K." muriate of potash, and "Ca." carbonate of lime. The figure following these letters indicates the rate of application in cwts. per acre. "P.", "N.", and "K." are applied each year, but only one dressing of lime has been given except where otherwise stated.

TABLE 2.—MANURIAL TRIAL AT CUDGEE—(E. R. MURFITT)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	77	130	137	118	132	136	730
1933	88	138	146	146	170	143	831
1934	115	225	159	158	183	222	1,062
1935	119	136	134	139	211	147	886
1936	81	106	115	119	194	111	726
1937	50	57	68	71	114	57	417
1938	27	36	44	45	65	34	251
1939	76	88	73	86	148	68	539
1940	25	27	35	35	57	27	206
1941	37	52	56	60	127	47	379
10 years' total	695	995	967	977	1,401	992	6,027

Phosphatic Fertilizers

Of all the fertilizers used superphosphate has been outstanding, and the responses to this manure have been generally good with the exception of some applications at Mirboo North, Cobden, and Lardner. A failure to give a good response to super. is usually due to the fact that other deficiencies are limiting growth. At Mirboo North it is lime that is needed, while at the other places mentioned potash is a limiting factor.

Under non-irrigated conditions, applications of "super." in excess of 2 cwt./ac. produce little or no benefit, and at some places, notably the North-Eastern plots, heavy dressings actually caused a depression of growth. This phenomenon occurred on pastures consisting almost entirely of subterranean clover. The "super." was applied at the rate of 2 cwt. per acre in the autumn and 1 cwt. per acre in the early spring.

TABLE 3.—MANURIAL TRIAL AT BENALLA—(W. J. PEARSON)

Total Annual Yields of Greenstuff in cwt. per Acre

Year.	Nil.	P¼.	P1.	P2.	P2. K1.	P2. K1. Ca20.	P2. Ca20.	P3.
1939	288	354	401	429	423	434	420	421
1940	18	49	65	81	86	101	82	77
1941	41	90	131	158	137	167	152	129

Generally, the amount of "super." that can be economically used is in proportion to the annual rainfall.

When the trials were commenced the withholding of superphosphate caused yields to drop by varying amounts up to 50 per cent., whereas the continued application of "super."

An excellent response to superphosphate is well illustrated in this picture.

Left—"Super." only. Right—"Super." plus potash. Note change in composition of pasture.

maintained yields until such time as the repeated mowings depleted reserves of potash and this became a limiting factor.

Leguminous plants are the pasture species that respond most to applications of "super." and if they are absent then the response is usually poor.

Potassic Fertilizers

At some places, notably at Cobden, Lardner, Yering, Larpent, and Cobrico, reserves of potash were not large when the manurial trials were begun and responses to applications of potash soon became evident. At other places mowing was continued for longer periods before soil potassium became depleted. As yet the trials in the northern districts have not been in operation for a sufficient length of time to indicate whether or not deficiencies of potassium will develop there.

A point of interest in regard to the development of a deficiency of potassium under mowing is that an application of 1 cwt. of muriate of potash per annum has been insufficient to prevent it, while double this amount applied to certain sections since 1936, although effecting a material improvement in the growth and botanical composition of the sward, has not so far restored the pasture to its original vigour.

Trials with "cement ash," a waste product containing potassium, have shown that it can be used effectively as a potassic fertilizer.

As in the case of phosphatic manures, clovers are the main responsive species and they disappear from the sward when the deficiency of potassium becomes acute.

TABLE 4.—MANURIAL TRIAL AT LARPENT—(J. J. ROGERS)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	98	160	168	176	194	174	970
1933	88	143	162	171	189	146	899
1934	124	185	173	175	232	191	1,080
1935	115	111	119	135	237	113	830
1936	104	124	126	133	233	127	847
1937	64	60	78	79	116	57	454
1938	33	36	45	48	65	33	260
1939	98	103	113	117	154	97	682
1940	30	33	44	43	80	38	268
1941	67	62	77	75	192	70	543
10 years' total	821	1,017	1,105	1,152	1,692	1,046	6,833

TABLE 5.—MANURIAL TRIAL AT KERGUNYAH—(I. S. WALLACE)

Total Annual Yields of Greenstuff in cwt. per Acre

Year.	Nil.	P¼.	P1.	P2.	P2. K1.	P2. K1. Ca20.	P2. Ca20.	P3.
1939	194	236	262	313	295	299	296	305
1940	170	208	250	297	295	289	273	272
1941	38	64	115	138	114	182	161	115

Nitrogenous Fertilizers

The nitrogenous fertilizer used in these trials is sulphate of ammonia. In practically all cases, with the exception of the first year or two, the application of this fertilizer has caused a depression in yield and in the amount of leguminous species in the pasture. On swards with little or no clover, sulphate of ammonia gives a small stimulus to growth and this state of affairs often exists on a soil depleted of potash as the pasture under such conditions is usually made up of weeds and some grasses, but very little clover.

It seems quite definite from the manurial trials, that it is uneconomic to apply sulphate of ammonia to pastures.

TABLE 6.—MANURIAL TRIAL AT MIRBOO NORTH—(EDNEY BROS.)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	* P2. N1.	P2. N1. Ca20.	P2. Ca20.	* N1. Ca20.	Ca20.	Total Production.
1936 ..	131	228	213	239	246	152	154	1,363
1937 ..	82	142	140	177	188	82	75	886
1938 ..	20	63	66	93	93	26	19	380
1939 ..	62	189	169	240	262	81	66	1,069
1940 ..	25	121 { P2 K1	} 142		156 { P2 Ca20 K1	} 27		..
1941 ..	39	223	217	210	233	212	38	..
6 years' total ..	359	966	..	1,101	1,178	..	379	..

Lime (Carbonate)

Although the application of lime to pastures which receive "super." as a regular practice has improved the vigour of growth in many cases, at only a few places has the increase been of any magnitude.

TABLE 7.—MANURIAL TRIAL AT WARRAGUL—(C. J. SNAPE, NOW T. BOARDMAN)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	* P2. N1.	P2. N1. Ca20.	P2. Ca20.	* N1. Ca20.	Ca20.	Total Production.
1936 ..	188	224	205	228	229	181	163	1,418
1937 ..	97	128	127	132	131	95	81	791
1938 ..	20	46	53	50	42	24	19	254
1939 ..	106	155	154	122	121	103	100	861
1940 ..	45	72 { P2 K1	} 61		58 { P2 Ca20 K1	} 66		..
1941 ..	61	134	219	101	106	247	74	..
6 years' total ..	517	759	..	694	687	..	503	..

* After August, 1940, P2 + N1 plots changed to P2 + K1.
N1 + Ca20 plots changed to P2 + Ca20 + K1.

As far as is known there is no definite evidence that if an application of lime fails to produce a satisfactory growth response, its use can be justified on other grounds, viz., to improve the health of stock.

The best responses to lime have been obtained on the red hill country of Gippsland, notably at Mirboo North and Limonite, but at one of the Warragul plots where responses were noted during the first two years, the stimulus to growth was followed by a depression in yield in subsequent years.

Equivalent amounts of various brands and forms of lime applied to lime responsive country at Mirboo North showed that as far as could be judged by eye, the results from all applications were uniformly good.

TABLE 8.—MANURIAL TRIAL AT COBRICO—(N. MASKELL)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	138	164	155	157	193	145	947
1933	81	108	136	133	174	110	742
1934	121	167	155	163	218	176	1,000
1935	87	107	108	120	232	111	765
1936	85	101	104	110	226	103	729
1937	85	105	108	119	175	113	705
1938	35	53	62	68	92	59	369
1939	71	92	103	111	190	97	664
1940	28	37	46	49	104	39	303
1941	44	69	78	92	219	77	579
10 years' total	770	1,003	1,055	1,122	1,823	1,030	6,803

TABLE 9.—MANURIAL TRIAL AT CORAGULAC—(E. W. MARTIN)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932 ..	119	123	146	146	152	144	830
1933 ..	89	117	121	120	121	129	697
1934 ..	193	228	211	204	191	220	1,247
1935 ..	138	176	180	172	169	169	1,004
to 6.10.36	72	81	90	83	85	74	485
5 years' total	611	725	748	725	718	736	4,263

At most places where "super." was withheld and lime used in its place, the yield dropped to the level of those plots from which "super." was withheld, and in some cases the application of lime actually caused a depression below this low level of production.

MOWING MANURIAL TRIALS, IRRIGATED PASTURES

The lay-out of the four mowing manurial trials which were commenced in 1938 is slightly different to those conducted on dry pastures owing to the fact that the land is laid out for irrigation.

At Stanhope and Swan Hill the plots (newly-established) are in the form of randomized blocks, while at Tongala and Cohuna the layout is more simple and consists of long differentially manured strips traversing the irrigation bays at right angles. In the two latter places, manurial and watering treatment has proceeded since 1925, first on lucerne and later on sown pastures.

The responses to various manurial applications on irrigated pasture are comparable with those obtainable from the same applications under natural rainfall conditions with the distinction that under irrigation it is practicable and economic to apply heavier dressings of *phosphatic manures*. This follows naturally from the fact that liberal supplies of soil moisture permit a heavier production of herbage and larger applications of fertilizer are, therefore, needed to rectify the natural deficiency of soil phosphate and the drain on the limited reserves.

Progressive responses to applications of "super." up to 4 cwt. per acre have been obtained at all plots, and although at Swan Hill and Stanhope further increases followed an additional dressing of 2 cwt. per acre, it seems that about 4 cwt. per acre would represent the optimum dressing. No improvement has been obtained by applying the 4 cwt. dressing in two dressings of 2 cwt.

Ammonium Sulphate has not effected any improvement at Swan Hill, and at Stanhope it caused a depression in yield. Although applications of *sulphate of potash* have promoted some heavier yields, except at Tongala, the increases have not been consistent, and at Cohuna, plots treated with potash and "super." have not yielded as well as those receiving "super." only.

Lime generally has effected a small improvement in yield, but this has not been as large as that obtained by applying an additional 1 cwt. of "super.". Applications of *gypsum* have produced a slight improvement in yield, while 2 cwt. dressings of *bone fertilizer*, although better than 1 cwt. of "super.", have not been as good as 2 cwt. of "super.".

Owing to wartime restrictions, mowing was discontinued in December, 1941.

PASTURE SPECIES TRIALS, NON-IRRIGATED PASTURES

The results from pasture species trials that were established in 1932 in Gippsland and the Western District have already been described in detail in previous reports, and as there has been no changes of note since the last report, it is not proposed to reiterate these results.

Trials in the North-East

The trials in the north-east have been in progress since 1938 only, and they continue to provide interesting new information on the behaviour of pasture plants under northern conditions.

A luxuriant pasture of white clover growing under irrigation.

Strains of subterranean clover. Left—"Dwalganup"; Centre—"Mount Barker"; Right—"Tallarook". Note sparse stemmy growth on "Dwalganup" and dense, leafy herbage on "Tallarook".

Of the sown species, subterranean clover is without doubt the most important, and it has become widespread as a result of top dressing with "super.". It appears voluntarily on all areas set aside for the trial of pasture species. One of the main studies in connexion with this species has been the comparison of the behaviour of various strains such as "early," "mid-season," and "late maturing" strains. The earliest maturing strain under trial is "Dwalganup," and already it has become apparent that although this strain is capable of making an early start, even in a relatively dry autumn, its growth is stemmy and often not sufficiently dense and leafy to smother the development of volunteer species such as barley-grass, &c. "Mulwala," another early strain, has behaved in a somewhat similar manner to "Dwalganup" except that it has been a little more leafy and, therefore, perhaps more useful as a grazing plant. The "Mount Barker" strain, which is a mid-season type, corresponds very closely to the regional types in the areas where the plots are located, and it seems at present that this strain represents the most suitable of those tried in these localities. Up to the present, the results from the trial of the late maturing "Tallarook" strain have been rather disappointing, as its autumn re-establishment has been belated each year, and in consequence growth during the autumn and winter poor. It is probably too soon yet to say whether this has been the result of abnormal seasonal conditions during the past few years, but if further trial shows it to be a feature of this strain, its usefulness on the areas where the trials are located will be rather limited, as winter fodder is very necessary.

Numerous species of grasses have been sown in combination with subterranean clover, and several points of interest have emerged from these trial sowings. Generally perennial rye has depressed the growth of the clover and other species with which it has been associated, including weed species, while Wimmera rye and Towoomba grass (*Phalaris tuberosa*) have proved very suitable associates for the clover.

On the experimental plots at Benalla and Wangaratta, population counts of perennial rye grass plants showed that the total number of mature plants dead and alive twelve months after sowing represented only about 25 per cent. of the number of germinable seeds sown. The mortality amongst these plants during the first summer was about 20 per cent. with a 4 lb./ac. sowing and 30 per cent. with a sowing of 8 lb./ac. In the third year, the population of rye grass plants for all rates of sowing approximated to two to three plants per square foot, and after four years only about one plant per square yard has persisted, indicating that perennial rye grass is short-lived under the conditions obtaining on these plots.

Experience to date with perennial rye grass would suggest that it is not as suitable as "Wimmera" or "Phalaris" and that, if sown, only light seedings should be used.

The suitability of Wimmera rye grass for the northern districts is not a new discovery and results from the plots merely serve to confirm current practice, but "Phalaris" is a relatively newcomer and shows promise of being quite a good perennial grass to grow in association with

subterranean clover. The high price of seed of this grass is the main deterrent to its wider use, but already it has been established on a number of farms with satisfactory results.

There are indications from the plots that "Phalaris" thickens up from year to year, and this would indicate that it might be practicable to sow perhaps only 1 lb. or less per acre with a reasonable expectation of obtaining a satisfactory stand within a few years.

Sowings of mixtures of "Phalaris" and perennial rye grass have shown that the rye grass has materially checked the growth and development of the "Phalaris" and the association of these two species is not recommended for northern conditions.

White Clover sown at Benalla and Wangaratta did not survive the first summer, and at Kergunyah (Kiewa Valley) is persisting only in the depressions.

Red Clover failed to persist at Benalla or Wangaratta, but has grown strongly at Kergunyah. Generally the sowings of lucerne were not a success as the strike was poor, although surviving plants are quite vigorous, and lucerne is grown very successfully in many parts of the north-east.

Palestine strawberry clover has been disappointing at the three plots in the north-east. The strike was fair, but the plants have been unable to compete satisfactorily with volunteer growth of annual clovers of which subterranean is the main one. Although the plants of Palestine strawberry clover remain green longer at the latter end of the season than most of the other pasture species, the Palestine clover contributes very little feed for stock at this time of the year, while during the winter and spring its growth is much below that of subterranean clover.

It should be noted, however, that the experimental plot sites are not well suited to species that thrive under moist, low-lying conditions, and possibly Palestine strawberry clover might show up to advantage in other places.

Species production trials were initiated at Benalla in 1939 with the object of measuring and comparing the production from various mixtures of pasture species. (See Table No. 10.) In order to provide further information one part of this trial was harrowed and rolled after sowing while another similar part was rolled only.

TABLE 10.—SPECIES PRODUCTION TRIAL AT BENALLA—(W. J. PEARSON)

Yields in cwt. of Greenstuff per Acre

Treatment	Rolled Only After Sowing.			Harrowed and Rolled After Sowing.		
Date of Cut.	P. Rye 4 lb., Cocksfoot 3 lb., Sub. 2 lb. per Acre.	P. Rye 8 lb., Sub. 2 lb. per Acre.	Phalaris 3 lb., Sub. 2 lb. per Acre.	P. Rye 4 lb., Cocksfoot 3 lb., Sub. 2 lb. per Acre.	P. Rye 8 lb., Sub. 2 lb. per Acre.	Phalaris 3 lb., Sub. 2 lb. per Acre.
8th May, 1939	5·2	10·5	2·2	15·2	17·1	3·6
13th June, 1939	25·2	29·3	12·1	44·7	40·7	14·7
6th September, 1939	53·7	43·3	54·6	52·1	32·4	46·8
5th October, 1939	62·5	67·1	64·5	59·3	55·0	62·2
13th November, 1939	71·4	49·9	65·5	65·5	57·8	77·9
18th December, 1939	15·5	15·5	19·8	13·3	15·7	16·6
Total for 1939–40	233·3	215·6	218·7	250·1	218·7	221·8
4th June, 1940	7·6	9·0	10·1	7·9	7·9	18·4
6th August, 1940	5·7	3·6	7·7	3·2	2·2	13·4
9th September, 1940	10·8	7·2	17·5	10·7	6·9	24·2
14th October, 1940	19·1	18·1	39·4	22·3	27·9	58·5
11th November, 1940			Insufficient	for mowing		
17th February, 1941	3·2	2·9	2·5	1·6	1·9	3·5
Total for 1940–41	46·4	40·8	77·2	45·7	46·8	118·0
24th March, 1941	14·9	14·2	12·0	10·2	12·4	16·6
12th May, 1941	9·6	8·2	10·9	9·0	10·8	14·0
25th August, 1941	16·3	13·4	21·7	15·2	12·8	30·4
16th October, 1941	41·8	50·8	59·3	52·8	60·5	84·0
26th November, 1941	2·9	2·3	3·5	2·3	2·5	3·2
Total for 1941–42	85·5	88·9	107·4	89.5	99·0	148·2

[*Continued on page 430*

MORE POTATOES ARE NEEDED!

Advice on Growing

By J. T. RAMSAY,
Potato Expert

Showing the advantage to be gained by applying manure with the seed (right) compared with broadcasting (left).

POTATOES are urgently required for the fighting forces and the civil population. The potato as a food is of vital importance, and this is emphasized by the Commonwealth Government's request for vastly increased production to ensure adequate supplies for the coming season.

So urgent is this need that the Federal authorities have guaranteed growers minimum prices which preclude loss even in the doubtful event of over-production.

Among those who will augment the area under potatoes will be many new growers with little, if any, experience in the handling of this crop. It is mainly for these that the recommendations made in this article are published.

The main points to be observed are preparation of the soil, storage, and treatment of the potatoes to be used for seed, manuring, planting, and intercultivation of the crop when growing. These are dealt with in the following pages.

Any further information on the subject will be promptly given on application to the Director, Department of Agriculture, Melbourne, C.2.

Preparatory Cultivation

In outlining the cultural operations by which land intended for a potato crop may be prepared, it is impossible to lay down any hard and fast rule which would suit all sorts and conditions of soil. This is so because there is such great variation in the soils, which may be of sand, clay, or any of the many gradations between these two extremes.

Again, varying climatic conditions demand varying treatments, and the times at which different classes of soils can be treated most advantageously will differ in the several districts. Notwithstanding all these variations, the object to be aimed at in preparing land for a potato crop, or any other crop demanding intense culture, is the correct mechanical condition of the soil or, in other words, the correct tilth.

Many land owners possessed of country which is naturally very fertile do not seem to appreciate the necessity for producing this condition of soil for the reception of seed. They appear to think that since they are planting seed in rich land, little more is necessary. Soil may be rich, and yet be in such a poor physical or mechanical condition as to render it entirely unsuitable for the free development of plants of high economic value.

The production of genial conditions for the reception of the seed of the potato crop is secured by the utilization of such implements as will reduce the soil to a condition of tilth which will make it amenable to the needs of the crop. There are several good reasons why this particular mechanical condition of the soil is essential. First,

Hand grading from the pit.

such a condition allows the roots of plants to branch out without restriction in search of food; secondly, useful bacterial activity is encouraged; and thirdly, percolation of water is promoted and evaporation of moisture retarded.

Wherever the depth of the soil will permit, the first ploughing should be to a depth of 7 to 9 inches, and the second about 2 inches shallower. There are many cases where the top soil is so shallow that this depth is out of the question. On land where the surface soil does not extend below from 5 to 6 inches, care should be taken not to plough to a greater depth than the surface soil.

In addition to the mould-board plough, the disc or spring-tooth cultivators, the roller, and the harrows all play an important part in the production of a good seed-bed. After the second ploughing the disc or spring-tooth cultivator should be used to further break down the soil. It is possible that only one or two strokes of the cultivator will be required to produce the desired effect. However, it is always well to err on the side of over-cultivation rather than under-cultivation.

It is not necessary or advisable to work the soil down too finely, as in the event of heavy rain falling it is liable to run together and become so closely set as to necessitate the whole of the ploughing and cultivating being gone over again.

Under normal conditions, however, if two ploughings and two disc or spring-tooth cultivations are given, the land may be allowed to lie in that condition until the time of planting. In the event of rain falling in any quantity subsequent to these operations, opportunity should be taken, as soon as the ground is in fit condition to carry horses or tractor, to run over it again with one or other of the cultivators. Harrowing at this stage is not necessary, and should be left until just before planting commences.

Cutting Potatoes for Seed

The cutting of potatoes to be used for seed is essentially a question of economy. Where only large tubers are available for planting it becomes necessary to subdivide these in order that they may provide a greater number of sets, and so keep down the cost of seeding per acre. In subdividing or cutting these, however, many growers go to extremes and slice up the tubers into pieces which are too small. Where this is done, the crop is handicapped at the outset. The question may be asked—what is the best-sized set? Before a direct answer can be given to this, several factors have to be considered. The first of these is the vigour of the seed parcel. Seed of weak constitution will not stand as much cutting as seed which has been selected out of a healthy and prolific crop.

Undoubtedly two of the main reasons for varieties of potatoes so quickly degenerating to a level at which their cultivation ceases to be profitable are that practically no selection of seed is made, and the seed used is too severely mutilated by the cutting knife. The second factor is the moisture content of the soil in which the seed has to be planted. Extremes of moisture and dryness are certain causes of "misses" when small-cut sets are used. Therefore, unless the soil is in a nice condition of moisture, either whole or fair-sized cuts should be planted.

A third consideration is the fertility of the soil. If the fertility and physical condition be good, the use of small-sized sets is permissible. The following comments and recommendations are based on the assumption that normally good potato land in a good state of tilth is to be planted, and that a parcel of potatoes made up of seed and marketable sizes is available for the planting.

In the first stages of growth the shoot or shoots produced from the seed set are entirely dependent on the nourishment they derive from the seed set. It is obvious then that larger sets can give a better start to the crop than can small sets, simply because they contain a greater amount of the essential nourishment for the first growth. In no circumstance should tubers of less than 1¼ oz. be used as seed for a field crop; in fact, seed of less than 1½ oz. weight should not be used if the soil and the seed are not in the best of condition.

In cutting large tubers care should be taken to see—first, that at least one good eye is left on each section; second, that the sections cut are as uniform in weight as possible and not less than 1½ oz. in weight (so much the better

if they are from 2½ to 3 oz.); third, that portions showing weak buds are discarded.

It is advisable that when cut the seed be placed in the ground as soon as possible. It is courting failure to cut and store it for some days before planting. The results of hundreds of tests prove that seed planted on the same day as that on which it is cut gives the heaviest yield. Dusting lime, ashes, or sulphur on the seed to dry the wound caused by cutting is not necessary, as the ruptured starch cells quickly dry on exposure to air. Sulphuring at this stage may have some advantage, not as a drier, but on account of its fungicidal action. In this capacity, however, it cannot be so effective as systematic dipping.

Method of cutting tubers over whole seed size.

The potato on the left of the top row weighed 3 oz.; the second from the left, 5 oz.; the third 6 oz.; and the fourth, 9 oz. The potatoes on the bottom row weighed 2½ oz., 1⅞ oz., 1⅛ oz. and 1¼ oz. respectively, and were too small for cutting.

Provided that the tubers used for seeding are normally healthy and are cut into pieces of equal weight, no section of the potato has superior vigour to another, i.e., stem ends and terminals are of equal value, weight for weight. The number of eyes on each set is of minor importance—it is the size of the set that counts.

The planting of the potato crop in Victoria extends over a considerable portion of the year. Commencing as early as June, in districts favoured with a mild climate, a succession of plantings continues without a break from June to December, and in the case of very late districts even into January. The major portion of the acreage, however, usually is planted during the period extending from the middle of October to the end of November.

That there is still a good deal of slackness or carelessness amongst potato growers is rather surprising in view of the fact that the potato is one of the most expensive crops to produce. As a rule, the land is high priced, and the cultural operations necessary for the maximum and complete development of the crop are such that they cannot be given without the expenditure of much time, labour and money.

Since, then, growing potatoes is a business involving an outlay of a large amount of capital, it is necessary that the planting of this crop be carried out in such manner as will give it every opportunity of a successful start.

The actual planting, for the most part, is done by hand, though a fair percentage of the Victorian crop is seeded with mechanical planters. Both methods are efficient. With hand planting it is advisable, first to run the harrows over the fallow to be sown so as to produce an even surface in order that the plough may work at a regular depth. It is not advisable to harrow more than a day or so ahead of planting, as, in the event of rain setting in, the soil, worked down finely by the harrows, is likely to become baked on the surface. The sets should be placed on the ploughed land side of the furrow, as there they are not only in loose soil, but also out of the way of the horses' feet when covering is being done, and less likely to suffer injury from this source.

The single, double, or three furrow plough may be used, the last, of course, being the one most commonly employed. An excellent combination, however, is a single and a double furrow plough working together. This outfit is really better than the three furrow plough, one of the main reasons being that the furrow in which the potato sets are placed need not be opened until planting is actually ready to be done. This is important when weather conditions are dry and warm. If the planting furrow is left open for even the space of time of the lunch

A close-up view of seed hopper and mechanism of planter.

hour, on a warm day, the crop resulting there invariably is lighter than in the adjoining rows.

The quantity of seed used should not be less than 12 cwt. per acre, and this quantity could with advantage be increased to 15 or 16 cwt. per acre.

Manuring

In practically all cases some manure should be given to fortify the natural fertility of the soil.

The correct time of application of artificial fertilizers is at the planting of the crop. The correct place is in the furrow with the seed—whether planting is done by hand or machine. It is estimated that any quantity of manure in the furrow is equal to at least half as much again broadcast either before or after sowing. The explanation of this is that when in the row with the seed, the manure is available from the time of the first root development. If broadcast, the root system of the plants have to extend the full width of the rows, 26 to 27 inches, before complete contact with the manure is made.

Research work has shown that the potato plant takes up plant food much more rapidly in the early stages of its growth than it does later. This fact emphasizes the advisability of having the manure close at hand to supply the needs of the crop immediately its root system commences to develop. If the fertilizer is broadcast and harrowed or ploughed in, a great percentage of it is distributed at such a distance from the sets that considerable root growth must be made before contact with the fertilizer is made. Consequently, rapid growth of the young plants is not possible, and the crop suffers a handicap which it can never subsequently overtake.

Depth of Planting

Another factor of importance to be considered is the depth at which the sets are placed in the soil. The potato is a sun plant, and the shallower it can be grown the better. It revels in a combination of sunlight and moisture. The habitat of the original wild potatoes from which all improved and commercially grown varieties have evolved is in the tropical belt of South America. Under tropical conditions there is, of course, an abundance of summer rain. The sub-tropical and temperate zones, where the bulk of the world's potato crops are produced, are not subject to the superabundance of rainfall of the tropics. Therefore, in these zones, deeper planting is necessary to ensure a supply of moisture for the crop. Indeed, in these zones, especially in the more southerly parts of Australia with its heavy winter and light summer rainfall, reliance has to be placed on cultivation to conserve moisture precipitated in winter in order to augment the meagre rainfall during the season of the year in which the crop is grown.

For the average local conditions prevailing in Victoria the best depth of planting is at from 4½–5 inches. Under normal weather conditions the maximum yields per acre are obtained from seed sown at about that depth. With machine planters there is always a danger of planting the sets at too shallow a depth. The ridging done by the covering discs of these machines is apt to deceive the grower. If any difficulty is experienced in getting down to 4½ or 5 inches with the machines, a good plan is to precede the machine planter with a spring tooth cultivator set to full depth. By its loosening effect on the soil, this operation will permit the mechanical planter to bury the sets at the desired depth of 4½–5 inches.

Spacing of Rows

For general practice, the spacing recommended is 27 inches between the rows and about 14–16 inches between the sets in the rows. If planting is done at these distances, and 2 oz. is the average weight of the sets, approximately 16 cwt. of seed per acre will be required for planting. This is not too much. Experienced potato growers

have found that it is sound business policy to use fairly heavy ratings of seed per acre and to manure liberally.

Early varieties such as Carman No. 1 and Manistee may be placed 14 inches apart in the rows. In the case of late varieties, like Late Carman, Up-to-Date, and Snowflake, the spacing may be increased to 16 inches. The reason for these differences in spacing between early maturing and late maturing varieties is that the early varieties as a rule produce smaller topped plants, and do not require so much room for development as do the large-topped late varieties.

During the past twenty years the writer has judged many field crops throughout the State, and has found almost invariably that the winners on points of quality and weight of tubers have been growers who practised close planting. The results obtained from trials conducted some time ago by the Ministry for Agriculture for North Ireland so emphatically confirm the soundness of the practice of close planting, which has been very strongly recommended by this Department, that they are worth quoting here. The test was carried out on three plots, for two years, the sets being planted at distances of 10–15 and 20 inches apart in drills 27 inches wide. The results were as follow :—

	tons	cwt.	
10 inches between sets ..	16	17	per acre
15 „ „ „ ..	13	4	„
20 „ „ „ ..	11	19	„

A feature decidedly in favour of close planting was that the tubers produced were invariably more uniform in size and shape and more attractive for marketing purposes than where thinner planting was adopted.

While it is not advocated that, in general potato growing in Victoria, potatoes should be planted so close as to allow only 10 inches between sets in the rows, this spacing could be approximated with advantage by growers for the earliest market (about October-November). These very early crops are generally grown in soils of a light character—sandy to loamy soils—which are fortified, either naturally or artificially, to a high standard of fertility. The higher the fertility of the soil in which the potato crop is grown, the closer the planting should be. For late crops grown in heavier soils, planting should be at wider spacings on account of late varieties growing large tops, and consequently requiring more room for development. The practice common amongst growers of late varieties, however, of spacing out their sets to 18, 20, and even 24 inches between them in the row is merely waste of ground. There is no justification for wider spacing than 15 or 16 inches between the sets of late varieties. A distance of 27 inches between the rows, which equals 29 rows per chain, has been proved to give ample room for horse cultivation in the heaviest ground, and this could with advantage be reduced to 26 or even 25 inches on fairly level country of medium to light texture.

Harvesting potato plots at Neerim.

Inter-Cultivation

There are important reasons why the soil should be cultivated after planting and during the growing period of the crop. First of these is the fact that well-cultivated soil is capable of absorbing and retaining moisture to a much greater degree than soil which is compact or hard.

The second important effect of inter-cultivation is that the physical condition of the soil is maintained at a good standard, thus permitting a sufficiency of aeration to take place. This has the effect of promoting the action of beneficial bacteria, which break down insoluble plant foods in the soil and make them available as food to the plants.

Further, by improving the mechanical condition, inter-cultivation permits freer root ramification and extension in search of the elements of fertility. Good mechanical condition too, has a very large influence on the shape of the tubers. In hard or compact soil the tuber when increasing in size, meets with restriction which causes deformity of the natural shape of the particular variety grown. In well-cultivated soil, however, the tuber is free to expand without restriction, and so develops to full size with more perfect shape. The last principal effect of inter-tillage—and not the least—is that foreign plants or weeds are kept in subjection or entirely killed—thus permitting the crop to benefit to the full extent from the plant food and moisture content of the soil.

Harrowing is the cheapest form of cultivation utilized in agricultural practice. By its employment a large area of ground can be cultivated to a shallow depth in the course of a day at very small cost per acre. Because of the cheapness of this method of cultivation, potato growers should utilize it whenever practicable in order, to keep down production costs.

After planting, and until the crop is well up in the rows—even to a height of 4 or 5 inches—effective work in preserving good surface tilth can be done by harrowing at frequent intervals of, say, one week. In the event of rain falling during this early stage of the crop's growth, the harrows should be used as soon as the ground is in working condition. This will prevent caking, or baking of the top, and help to conserve moisture.

Frequent harrowing at this stage is an excellent and economical means of killing off weeds as they germinate, and, if done systematically, will eliminate the necessity for much weeding later on. Once the plants reach the height of 4 or 5 inches, subsequent cultivation, up to a time when they are about in full bloom, must be confined to the horse hoe, an implement designed specially for cultivation between the rows of any growing crop. It is capable of being adjusted in the width and depth of cut to suit the requirements of any stage of growth of the crop.

Owing to the wide variations of soil textures and seasonal conditions, it is not possible to set down any hard and fast rule as to the number of horse-hoeings that should be given to the crop, but it may be safely advised that there should not be less than two to three during the season. The intervals of time between the hoeings will vary with the seasons and the rate of growth of the crop, but the interval between each horse-hoe cultivation should be about a fortnight.

One point that can be strongly advocated is that opportunity should be taken to use the horse-hoe as soon after rain as possible, the objectives of course being the reconditioning of the tilth and the conservation of water.

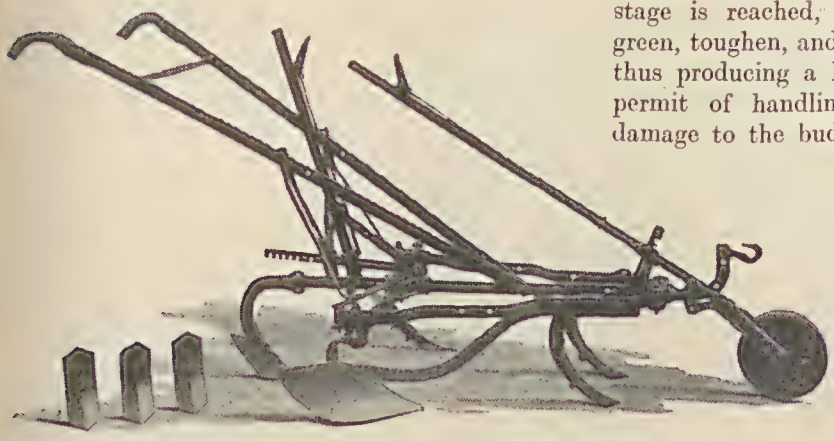
The first hoeing of the season should be done at the greatest depth at which the team can manage the implement and at as wide a distance as possible without unduly disturbing or damaging the plants on either side. Each subsequent hoeing should be at a narrower width and a shallower depth in order to accommodate the cultivation to the increased growth of the plants. If the season permits an approximation to these suggested times of hoeing, the plants normally should be just coming into full bloom by the time the third cultivation is given.

Hilling

The next operation in inter-cultivation is the hilling or moulding up of the plants in the rows. This is advisable for two reasons, the first being that it saves the tubers formed near to the surface from being scalded by the sun or greened by the action of light. Tubers greened by exposure are unfit for consumption, being bitter to the taste and mildly poisonous, owing to the development of solanum. Cases are on record where stock have died from being fed on greened tubers.

Another very important result effected by hilling is that the tubers are protected from attack and damage by the grub of the potato tuber moth (*Phthorimaea operculella*). In a hot dry season favorable to the rapid increase of the moth and grub, a crop which is unprotected by hilling may be riddled in less than a week by these grubs. Good hilling, combined with good tilling, is a safeguard against loss from this source, up to the point of digging.

A further benefit from hilling up the crop is that digging, either by machine or hand, is facilitated, as the machine or fork can be projected with greater ease to a depth slightly below the the level of the deepest tubers, and there is less risk of damage to the tubers.



A popular type of horse-hoe with hilling attachment.

Storage of Seed

The purchase and transfer of potatoes for use as seed are at present taking place on a large scale. This is due to the effort to secure a vastly increased acreage for the 1942–43 season. It is vital that this seed be conserved with its vitability unimpaired and to reduce wastage to a minimum. This can be done only when a proper system of storage is used. Storage, if it is to prevent rot, demands abundance of ventilation. Potatoes intended for seed should be emptied from the containers as soon as possible after delivery, and spread at shallow depths. Suitable places for storage are under trees, preferably pines, open sheds, and other reasonably sheltered places. Protection from frost may be given by a very light covering of straw. Access to the seed by stock, of course, should be prevented.

Normally as much light as possible during the winter and spring seasons should be given, but, in view of the importance of earlier and increased production than usual, sprouting should be accelerated by the exclusion of light until the sprouts begin to show movement. When this stage is reached, light should be admitted to green, toughen, and restrict growth of the sprouts, thus producing a hardened condition which will permit of handling at planting time without damage to the buds.

Prior to placing in position for storage for the few months before planting, it is advisable that the potatoes be given some fungicidal treatment in order to minimize possible damage to the crop by such diseases as Collar Stem Rot and Common Scab. Dipping of all seed should be done, but where labor is scarce, the spraying of the seed with a fungicidal preparation will provide some deterrent action and will be better than none.

Potato Contracts and Superphosphate Supplies

Unfortunately, war has limited supplies of artificial fertilizer to such an extent that rationing has become necessary. However, the need for growing more potatoes is of such importance that they have been given priority over other crops in this respect.

The position in regard to manures, however, is such that growers must obtain approval for their requirements by applying to the Department of Agriculture. Approval will be given as far as possible.

Potatoes are to be grown under contract to the Commonwealth Government in the season 1942–43, and all intending growers should lodge their contract forms, together with particulars as to manure requirements, with this Department as early as possible. These forms are obtainable from local potato inspectors or direct from the Department of Agriculture, Melbourne, C.2.

TO LEND IS TO FIGHT
BUY WAR SAVINGS CERTIFICATES!

COHUNA DISTRICT

Fodder Conservation Competition

Report Submitted by the Judge—A. MORGAN, B.Agr.Sc., Irrigation Field Officer

HELD under the auspices of the Cohuna Agricultural Society, and sponsored by the Royal Agricultural Society, the Cohuna District Fodder Conservation Competition was concluded recently. Comments on the district and leading competitors' farms are given hereunder.

Although the building up of fodder reserves was hampered by a shortage of farm labour, Cohuna district farmers managed to make a very good showing compared with other years. A dry spring and summer favoured them in regard to curing the produce, and frequent irrigations ensured that growth of lucerne and pastures was well maintained.

The district, viewed as a whole, does not present a very prepossessing appearance, because of the patches of alkali-affected soil which are visible from practically every road and lane. The irregular heaps of clay which mark the drainage channels are also a depressing sight until they become covered with volunteer grasses and herbage plants. However, the areas unaffected by "salt," or which have recovered from its worst effects, have been made highly productive, and in most cases appear to be well able to carry the burden of the unproductive lands.

In development, the Cohuna district, on the average, is a long way ahead of some other irrigation districts with equal advantages in regard to irrigation supplies, often with equally good soil, and practically free from "salt". White clover, strawberry clover, *Paspalum dilatatum,* and rye grass are the most prominent species in pastures which have developed on the "red land" (Mallee type soil) as a result of frequent, regular waterings, and the continued use of superphosphate. In some sections perennial rye grass has come in as the fertility has been built up by clover growths stimulated by top-dressing and in these areas prairie grass (*B. unioloides*) is often conspicuous during the winter months. A good

"Salt" land, bearing salt-weed. This weed is almost worthless, but in reclamation is often the forerunner of better pasture species.

deal of lucerne is grown, but in general it is not re-planted as the stands thin out, the transformation to pasture usually occurring simultaneously with the deterioration of the lucerne.

In the more "salty" paddocks, couch grass (*C. dactylon*) may be the first summer-growing grass to take control. A considerable area of alkali-affected land of a plain character is watered only in the autumn and spring, and grows sea barley grass (*H. maritimum*) and trefoil, which species are often replaced by Wimmera rye grass and subterranean clover when the degree of recovery from alkali is considered satisfactory. The depressions which occur in the undulating Mallee country are in most cases characterized by heavy grey or black soil, severe salt-damage, poor natural drainage, and poor permeability to irrigation water. These areas, in the preliminary stages of reclamation, carry large patches of halophytic weeds showing various tolerances to alkali in the surface soil. The more common species are as follow:—"Red weed" (= seablite, *Suaeda maritima*), "bead-bush" (= samphire, *Salicornia australis*), rosinweed (*Cressa cretica*), one of the "roly-poly" weeds (*Salsola kali*), sand spurrey (*Spergularia rubra*), barb grass (*Lepturus*), and a sprinkling of sea barley grass.

Transverse levelling in land-grading.

In the reclamation of these badly-affected paddocks, as far as irrigation is concerned, the methods in use are varied. Some settlers prefer to water in autumn and spring only; some water them frequently right through the irrigation season; some irrigate them in a sporadic manner, and in other cases the worst paddocks are left unirrigated until the recovery under rainfall alone is considered to justify some assistance from channel supplies. In some cases the paddocks are graded and banked, and various systems are employed to enable them to be watered on the border-check method without undue scouring on steep slopes; in other cases a modified ponding system is employed until paddocks are partially reclaimed, when ordinary irrigation practice is substituted. At the stage where the change-over is made, ponded paddocks are usually recognizable by their heavy growth of rushes, cumbungi (*Typha*), and Murray aster (*Aster dumosus*).

In the worst stages of alkali, the surface soil is a powdery dust in the summer and a slimy mud after irrigation or winter rains; the subsoil is a greasy structureless clay on the heavy land. As improvement proceeds the surface soil hardens and cracks, and patches of grass and clover grow in the shelter of the "salt-weeds". If the land has been graded, the grass and clover spread until the weeds are eliminated; thus the district provides examples of all stages from sterility to outstanding productivity, and it is the relative area of the latter which determines the fodder reserves production from a particular block. Lucerne, clover, and *Paspalum dilatatum* pastures, oaten hay, and subterranean clover are the principal sources of fodder reserves in the settlement area; millet and sorghums, except where planted as reclamation crops, are not as popular as they are on plain land under irrigation. The utilization of land on the small blocks is shown in Table 1 on the following page.

If we assume that the farms referred to in Table 1 represent an average of the district, the significant conclusion to be drawn is that about half the area is under permanent pasture. It is interesting to compare Cohuna to Swan Hill, where lucerne still occupies a predominant position. In both cases dairying is the main activity on the small blocks, and irrigation conditions are very similar in regard to supply.

Alkali and soil types are the essential differences between the two communities, and provide the explanation of the divergency in respect of the relative popularity of lucerne and permanent pastures. In the Cohuna district, the fact that a considerable area was thrown out of production by alkali forced irrigators to adapt their methods to new conditions, and to concentrate more on the watering and top-dressing of the remaining good land.

TABLE 1.

Exhibitor.	Total Area.	Acreage used for— (a) Lucerne.	(b) Permanent Pasture.	(c) Subterranean Clover.	(d) Cereal Hay.	(e) "Natural" Pasture and "Salty" Land.
	acres	acres	acres	acres	acres	acres
C. L. King ..	140	25	100	13	..	..
C. Rickets ..	38	16	20	..	..	..
H. Stone (No. 1)	90	1	86	..	..	1½
Estate—A. E. Fenn	73	15	56	..	..	..
C. A. Schier ..	360	..	70	60	15	215
H. Stone (No. 2)	120	..	64	..	..	55

Another feature of the district is that there are many very productive pastures in paddocks which, according to modern standards, are very badly laid out for irrigation. The owners have not been able to dispense with the feed from these paddocks for the time necessary to remodel them, and the fact that *Paspalum dilatatum* is very luxuriant, and will require very drastic treatment before re-grading can be carried out satisfactorily, is also an important consideration.

Subdivision has been actively prosecuted on the small blocks in both districts, but equal progress has not been maintained in regard to structures to facilitate farm traffic and control of irrigation water. All of these must be considered to have a direct bearing on fodder conservation, since inconvenience in any phase of growth or harvest wastes time and energy which cannot be spared. Designs of structures suitable for the district can be obtained from the State Rivers and Water Supply Commission.

Sheds for the storage of fodder were absent on all the properties visited. Stackyards in general were not as neat and well-kept as could be desired, but protection from stock was adequate if not first-class. The limitation of reserves to seasonal requirements has meant that protection from weather (except high winds) has not been given much attention. There is not the excuse that the material is likely to be chaffed or pressed for storage. The method employed by Mr. H. Stone in protecting pressed meadow hay was very neat and efficient, however. A level site on unirrigated ground was chosen, and the bottom layer of bales was arranged with an *even* number *each way* (say, 8 by 8) and with the long axes all in the same direction. In the second layer (see Fig. 1) the ends are made with four bales.

Land being laid out on the border system—the basis of good irrigation practice.

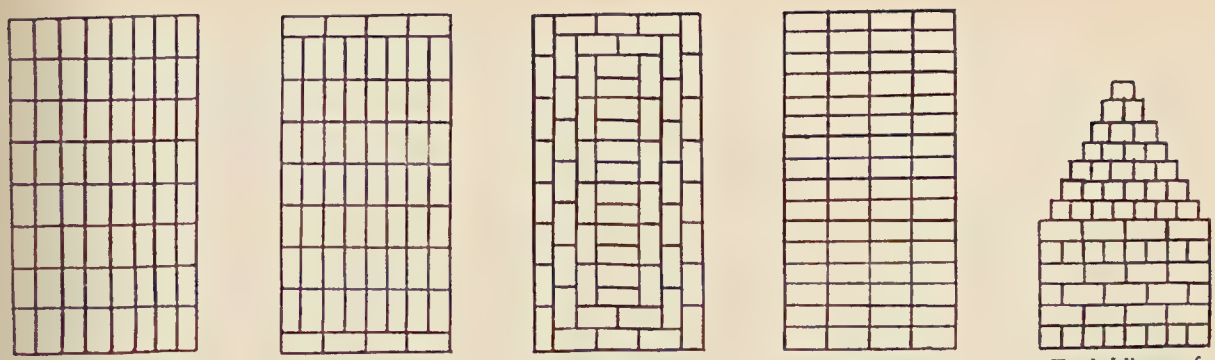


Fig. 1.—Showing method of stacking baled meadow hay on the property of Mr. H. Stone. This stack contained 608 bales.

each bale with its long axis across the width of the stack; the remainder of this layer is composed of bales with their long axes along the length of the stack, as in layer No. 1. In the third layer, if the first bale is put on at any corner of the stack, its long axis should be in the direction of the length of the stack, and by working around the stack with the long side of each bale to the outside the bonding will be correct. By following this system with the inner rows (although in practice the stacking might not be done this way) the third layer is correctly placed. For the fourth layer, put every bale with its length across the width of the stack (i.e., all the bales in this layer are at right angles to those in the first layer). The fifth layer is the same as the first layer, the sixth the same as the second. In the seventh layer, the bales are 8 by 7; in the eighth 8 by 6, and so on, until the ridge is composed of a row of eight bales. In the layers 7 to 13, all bales are placed with the long side in the direction of the length of the stack. The smooth side of the bale is always put to the outside to give better run-off of rain water. It is useful to know how many bales can be put in a completed stack of a certain size, and this can be worked out beforehand. Thus an 8 by 8 stack contains (8 x 8) x 6 plus 56, plus 48, plus 40, plus 32, plus 24, plus 16, plus 8, equals a total of 608 bales. An eight-tiered 8 by 4 stack contains (8 x 8) x 8 plus 24, plus 16, plus 8, equals 304 bales, and so on.

The Awards.

First prize was secured by Mr. C. L. King, whose property, totalling 140 acres, is carrying 62 cows, 1 bull, 12 poddies, 5 draught horses, and 13 hacks. The milk produced supplies a milk round for the township, and tests more than 4·0 per cent. Lucerne, permanent pastures, and subterranean clover are grown, the various acreages being shown in Table 1. Top-dressing has been carried on for some time at the rate of one bag to the acre.

The stacks exhibited were grouped in a yard near the farm house, and protected from stock by a cyclone fence with a plain wire and a top barbed wire. Four stacks of lucerne hay, one of them two years old, one three-year-old stack of oaten hay, and a butt of two-year-old oaten hay comprised the exhibit. The older oaten haystack had been topped with lucerne, and was "mousey," while the butt had sunk in on the weather side. These observations make it obvious that protection from weather and from vermin is necessary in the case of cereal hay kept over more than the one winter, more especially since the winters have been dry for the last two years. Although the points allotted as per the schedule show a narrow margin of reserves over temporary needs, Mr. King sold 20 tons of lucerne hay last year. The lucerne hay was of good quality, and except for one small stack was this season's produce. During the winter a cartload is taken out each night to the milkers.

Mr. C. Ricketts, who won second prize, had three lucerne stacks. The property is small (38 acres), and apart from 16 acres of lucerne is carrying mixed pasture. The quality of the pasture was variable, as the property is recovering from "salt" in some parts. Twenty-six cows are usually milking, and a total of 36 is carried. The acreage available is considered too small to carry any young stock in addition, so these are disposed of as soon as possible. At present a two-year-old

Red Poll bull is being used. Two draughts are kept for routine farm work. These, and the dairy stock, were in good condition, and the paddock growth was good. A boar and five breeding sows are kept, and the young pigs fattened; crushed grain for this purpose is bought in. Greenstuff is cut and carted in for them nearly every day.

The stackyard was in a tidy condition, with a good wire fence and stout wooden gate. The largest stack, consisting of first and second cut material, was practically half grass hay, and the remainder lucerne. Rye grass, prairie grass, and clovers were well represented in the sample, which was of good colour and aroma. The lucerne in the remaining stacks was rather coarse, but otherwise in good condition. Altogether, Mr. Ricketts has made a very good job of his block, which was once condemned because of the "salt". Bare patches still remaining are re-seeded each winter by unloading the grass hay on them when feeding out. In addition to the stacks, the pig-shelters were roofed with hay, which could be used in an emergency.

COHUNA FODDER CONSERVATION COMPETITION, 1942. DETAILS OF THE AWARDS.

Exhibitor.	Quantity and Quality.	Green Crops.	Excess.	Suitability.	Condition of Stock.	Location.	Protection.	Total.
Possible Points ..	80	10	60	15	10	10	15	200
C. L. King ..	78	9	15	15	10	9	14	150
C. Rickets ..	80	10	6	15	10	9	14	144
H. Stone (No. 1) ..	68	10	..	15	10	9	15	127
Estate—A. E. Fenn	56	10	..	15	10	9	14	114
C. A. Schier ..	32	5	..	15	10	9	14½	85½
H. Stone (No. 2) ..	14	10	..	15	10	9	15	73

Fertilizer Rationing

Owing to the shortage of all types of fertilizer, official arrangements have been made under which producers of priority crops will be able to obtain essential supplies.

Owing to reduced imports of phosphatic rock, the total quantity of superphosphate likely to be available for all purposes in 1942–43 will amount to only one-half of that normally used, and approximately one-third of that used in the record consumption year 1937–38. In addition, owing to the lower grade rock used, superphosphate manufactured will contain only 18 per cent. phosphoric acid, instead of 22 per cent. as formerly.

The Australian Agricultural Council recently decided that production of vegetables, flax, and potatoes was so important that these crops should receive normal quantities of fertilizer per acre. However, farmers requiring a special ration for these crops must obtain from the Fertilizer Section, Department of Agriculture, 61 Spring-street, Melbourne, a permit to enable them to purchase their requirements. Application must be made on a special form obtainable from the Department, or, in the case of potatoes, from district potato inspectors. Fertilizer rations for potatoes will be granted only to growers who have signed Government contracts to plant this crop.

Limited supplies of superphosphate will also be made available immediately to those farmers not requiring fertilizer for priority crops, but who normally purchase their fertilizer requirements in the four months July to October. Manufacturers have been authorized to sell to such consumers not more than 40 per cent. of the quantity purchased by them in these months last year. Growers requiring supplies, and who are not eligible for special rations for priority crops, should lodge their order immediately with the company or agent who supplied them last year.

Farmers, graziers, and orchardists who usually purchase superphosphate in the period 1st November to 30th June are advised that the maximum ration they may expect to be able to obtain in that period is 40 per cent. of the quantity they normally use. The final decision, however, will depend on the quantity available, and the needs of the different priority crops.

AUSTRALIA NEEDS NAVY BEANS

A year ago, the Navy bean was practically unknown to Victorian farmers. Now, a new crop valuable for defence purposes and profitable to Victorian agriculture has been established permanently in the State. A little less than 2,000 acres were planted last year. Today, we are calling for at least 5,000 acres for spring planting in Victoria.

Through the Department of Agriculture, growers with suitable land and facilities may make a contract with the Department of Supply to grow Navy beans. They will be supplied with seed, the cost of which, at twenty shillings per bushel, may be deducted from crop returns and they will be enabled to purchase up to 2 cwt. of superphosphate per acre from their usual merchant after they have made application on the proper form to the Fertilizer Rationing Branch of the Department of Agriculture.

The Department will purchase crops grown under contract on a valuation based on the percentage of beans of canning quality. Where not less than 97 per cent. of the crop consists of sound beans of a good white colour, twenty shillings per bushel will be paid. The price will fall as the percentage of damaged or discoloured beans increases. The difference in price takes into account the cost of seed cleaning to rid the sample of blemished beans as well as the loss in weight due to their removal. A bonus of 2s. 6d. per bushel will be paid for beans 100 per cent. suitable for canning.

The growers who pioneered this crop in its first big year in Victoria did so under difficult climatic conditions. The spring was cold and windy and some exposed crops sown early, in the first half of October, failed on this account. Then followed two or three months of very dry weather in the principal Gippsland districts where normally reasonable spring and early summer rains are expected. A heat-wave at Christmas time when most crops were in full flower caused most of the blossoms of the main crop to fall and further growth was necessary to produce a new crop of flowers. This delayed ripening until April and threw the harvesting into May, in which month an "all-time" record for rain was established in most districts.

Under such conditions there were some failures and disappointing returns, but there also were crops which yielded over 50 bushels per acre, and a number between 30 and 40 bushels. In a year which was unfavourable for beans of all types the Navy bean proved a very hardy plant able to withstand appreciable drought and to remain comparatively free of disease. In good bean country yields of over 30 bushels are to be expected with reasonable seasons and in drier, less favoured areas where beans will still grow normally, 15 to 20 bushels per acre should be obtained.

The following brief discription of the crop is given to enable farmers to decide whether it would be practicable for them to apply for a contract to grow Navy beans. A fuller description embodying all experience gained by Departmental officers to date will be published later for those who undertake the work.

Applications for contracts by farmers in Victoria desiring to plant should be made in writing to the Director, Department of Agriculture, Treasury Gardens, Melbourne, C.2.

Brief Description

The Navy bean plant is closely related to the well-known dwarf French beans such as Canadian Wonder and Brown Beauty, and requires similar growing conditions. It thrives best in well-drained free-working soils. A summer rainfall of at least one inch per month, or irrigation, is necessary. Strong winds, especially cold winds in spring, are undesirable. A district which has grown peas and other beans successfully is usually suitable.

Last year good crops were grown on swamp soils, river flats, light hill soils, red hill soils, and light and heavy irrigation soils. Typical centres of production were Koo-wee-rup, Lindenow, Bairnsdale, Orbost, Leongatha, Alexandra, Nyah, and Murrabit. Trial plots have grown well

at Daylesford, Koroit, Beech Forest, Beechworth, Whitfield, and in the Dandenong Ranges. Fair to good soils in any of these and similar districts should produce good crops.

Soil Preparation

Thorough soil preparation is essential, particularly to provide a good seedbed and destroy weeds. Land should be ploughed in the autumn, left rough during the winter, ploughed again in the spring, cultivated to destroy at least two crops of weeds, and harrowed and rolled just prior to seeding. The soil should then be level and in fine tilth. It is realized that all growers may not be able to provide all such conditions; but contracts will not be made with growers whose land has not been reasonably well prepared.

When to Sow

The most favourable time to sow depends on the district, but in general is when cold winds and frosts have ceased, say in September and October. This would allow harvesting in March, when dry weather can be expected. In the drier and warmer irrigation district, sowings could be made as late as January.

How to Sow

The beans are grown as a row crop. Small areas can be planted by hand or with a "Planet Junior" type of hand drill, but sowing is usually done with a grain, maize, or beet drill with the appropriate settings. The distance between rows may be 18 to 36 inches, depending upon the freedom of the soil from weeds, the type of drill and the cultivating implements available. On weed-free ground it pays to keep the rows as close together as will allow later cultivation and irrigation to be carried out efficiently. The most common row spacing is 30 inches.

Seeds in the row should be spaced about 3 inches apart, and should be sown about 2 inches deep. The amount of seed required per acre depends upon spacing and variety, and ranges from 20 to 40 lb. Thus Navy beans are not a costly crop to sow.

Protection

Beans suffer from heavy winds, particularly when young, and require a reasonably sheltered position. Where the site is exposed, inter-planting with sunflowers, maize, rye-corn, or barley in narrow strips half to one chain apart is recommended.

Manuring

In view of the fertilizer position in Australia, the best recommendation seems to be to apply to soils which show a response to manures a dressing of 2 cwt. of "super." per acre. This manure should preferably not come in contact with the seed, but is best placed in a band within an inch or two of the seed and slightly below it.

Cultivation and Irrigation

The field may be harrowed two or three days after planting to destroy weeds. It also may be harrowed until the time the beans are 2 inches high provided a warm, dry day is chosen for the operation. Later tillage must be by rows. Cultivation should be shallow, and should cease at the flowering stage. Weeds in the rows should be removed with the hand hoe. Irrigation should be frequent and light. The need for watering is indicated by the leaves taking on a blue-green tinge.

Harvesting

The beans should be left to mature until after the pods turn yellow. The seed is in no danger of falling, and if the crop has been well grown, without check, most of the pods will ripen together. In harvesting, the plants may be pulled by hand or skim-ploughed out.

Threshing

After lying in the field for a few days to cure, the plants may be carted in for stacking or immediate threshing, or may be threshed in the field. This curing is the most critical time of the harvest, for, if rain comes at this stage, the plants must be turned over to prevent damage of seed by staining or mould in the lower layers. Again, it is necessary to avoid wetting of stacks, and if this occurs, the stacks must be spread immediately to dry rapidly. The beans are easily threshed. For small lots, flailing or rolling with a light farm roller on sheets is quite satisfactory. For larger areas, the pea thresher is excellent, but any type of threshing machine can be adapted easily. Care should be taken that the right speed is used to avoid breaking the bean seed. The power-driven header with a pea *pick-up* attachment has been very successful in direct harvesting in the field of crops which have been pulled by hand or skimmed out; but, to date, direct harvesting of Navy beans by the power-driven header fitted with the pea *front* has not been successful.

[*Continued on page 420*

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Salvage on the Farm

THE need for careful handling of farm implements to avoid breakages and unnecessary wear and tear is greater now than ever before. Apart from the higher cost of replacements, there is the more important consideration that factories engaged in war production should not be hampered by having to supply civilian orders which, with care, could have been done without.

The farmer also should give attention to the question of salvage on his property. The Commonwealth Government announces from time to time that certain forms of scrap are required. As announcements are made, a receptacle should be found for each class of scrap, which could be delivered periodically to the municipal depot or other collection centre.

Useful scrap includes worn-out rubberware, metals of all kinds, paper and cardboard wrappings. In addition, there are the various odds and ends collected by charity organizations.

Discarded teat-cup inflations, rubber tubing, and flanges from milking machines, worn-out hoses, gum boots, and tires and tubes from cars, trucks, carts, bicycles, and perambulators are now required for the reclamation of rubber.

When tidying up the implement shed and blacksmith's shop, all unrequired, broken and worn-out iron and steel parts should be set aside for delivery to the nearest salvage depot. Old copper and brass fittings used in electrical appliances, milking machines, and water systems will assist in the war effort. Old aluminium kitchenware also is valuable scrap.

Bags

At present there is an acute shortage of bags. Although second-hand bags are not scrap, they are often treated as such, and are left to rot or be damaged by vermin. Second-hand bags are now very expensive and, to keep up their supply, most firms are offering substantial rebates for the return of empty bags. All feed, fertilizer, and other bags should be thoroughly shaken out when emptied and stored in dry, clean places out of the reach of rats and mice.

Dairy Cows

The slaughter of dairy cows during the past six months has been so great that, unless every heifer calf is reared this year, there will be a serious shortage of dairy cows in two years' time.

Dairy farmers have been forced to reduce their herds in proportion to the man-power now available. This reduction has been

profitable because the prices received for dairy stock sold for beef have been good, while prices received for butter-fat have not kept pace with the increased costs of running the farm.

Because beef is so dear dairy farmers are often unable to compete with butchers for well-fleshed springers and milkers at the sale-yards with the result that many good dairy cows are being slaughtered.

Dairy farmers should rear every healthy heifer calf born now, and those who have had to reduce their herds are advised to re-stock with home-bred heifers. The present prices offering for beef make it payable to rear for beef dairy-bred steers, particularly Ayrshires, Shorthorns, Friesians, and Red Polls and their crosses.

Beef Cattle

Although beef cattle are scarce and bringing high prices, the demand greatly exceeds the supply, and butchers are to be seen in the dairy cattle pens often outbidding dairymen for springers and milkers.

The prices of beef cattle are the highest for very many years, and many breeders are prepared to sell portions of their young breeding stock and to re-stock with sheep, with the result that high prices are likely to continue for some time.

In the United States the position is quite different. At the beginning of this year the total number of cattle on farms was 74,607,000 head, an all-time high record, and 4 per cent. above the 1941 total. To prevent a further increase in cattle numbers, the Secretary of the United States Department of Agriculture has arranged a "marketing for slaughter" goal of 28,000,000 head of cattle and calves this year. To meet this goal a policy, which has been summarized below, has been decided upon—

(1) to market more cows and heifers, to prevent further increases in cattle numbers;
(2) to pay off indebtedness now that prices and demand are good, so as to avoid the danger of having to pay debts later when prices fall;
(3) improve breeding herds by culling out and selling inferior animals while the demand is good;
(4) keep livestock numbers in balance with normal feed supplies.

Drought can cause much loss if no feed reserves are available or if ranges are over-grazed.

With the exception of the advice to reduce numbers by marketing more cows and heifers, this policy could well be put into practice in Victoria. Little provision is made by beef producers to safeguard against droughts with reserves of hay silage or other fodders and have a regular supply of fat stock each year.

Foal Bonus Scheme

To encourage the breeding of the best type of draught horse, the Government has decided to continue for a further period of two years the payment of a bonus of £2 for every foal the progeny of a registered draught stallion and an approved mare.

The scheme was in operation during the year ended 30th June last, and in that period the bonus was paid in respect of 1,415 foals.

The conditions governing the bonus are as follow:—

(1) A bonus of £2 will be paid to the owner of every draught foal the progeny of a draught stallion registered under the *Horse Breeding Act* 1928 and a mare approved by the Department of Agriculture. "Owner" means owner of a mare at the time of foaling.
(2) *Approved Mares*—
(*a*) Mares must the property of a Victorian stock owner, and must have been served and have foaled in this State.
(*b*) Mares registered in the Commonwealth Clydesdale Stud Book may be approved without inspection.
(*c*) Subject to satisfactory proof, mares eligible for registration in the Commonwealth Clydesdale Stud Book may be approved without inspection.
(*d*) All other draught mares will be subject to inspection before approval.
(*e*) No mares will be approved unless the Chief Veterinary Inspector is satisfied that they are of a reasonable standard in respect of type, conformation, and breeding.
(3) Foals in respect of which a bonus is applied for must be alive at the time the application for the bonus is made.
(4) Application for the bonus must be made to the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2, before the 30th June, next following the date of birth of the foal, and such application must be in the approved form.

Drenching a Horse

The correct way to administer a drench to a horse is to raise the head only slightly above the level. This may be done by passing a loop at the end of a light rope round the upper jaw behind the front teeth. The free end of the rope is passed over a roof beam, and the horse's head held up in position. The head should not be raised any higher than just enough to allow the drench to run down the throat instead of out of the mouth. The dose of medicine should then be poured *slowly* into the back of the mouth from a bottle or through a drenching bit. When a drenching bit is used there is no need for the loop of rope on the upper jaw, as the head can be raised by the rope on the bit. If the animal attempts to cough, immediately lower the head and allow the mouthful of medicine to run out.

Never drench a horse through the nose unless a stomach tube specially designed for the purpose is used, as the fluid may go down the windpipe into the lungs, and the animal will probably contract pneumonia and die.

[W. M. Lerew, G.M.V.C., Veterinary Officer.

Sheep

All stud and flock ewes should be classed now at the first convenient opportunity before shearing. Provided they carry sufficient wool and are in reasonably good condition, sheep may be classed at any time that fits in between the other work.

Working sires also should be re-classed and suitable new sires selected for replacement purposes.

Tentative, if not definite, arrangements should now be made for shearing, and, apart from the labour position, a general check-up is recommended. The yards and sheds should be overhauled. All fences should be sheep- and lamb-proof, and the gates should swing well and have secure catches. The track from the yards to the shed should be weatherproof and all puddle-holes should be filled up. It is desirable to have a concrete floor on the drafting race. In the yards there should be no projecting nails, wire, or broken battens that might injure the sheep.

In the shed, the board, chutes, if present, and wool room should be washed with hot water containing a reliable disinfectant. The wool tables and press, including the ropes, should be overhauled. The scales should be tested and bale stencils complete. A complete set of stocks of the following is necessary:—Wool packs, bale fasteners, stencil ink, raddle, branding brushes, sheep brands, branding oil, disinfectant or suitable sheep dressing, and all necessary duplicates. It is also desirable to have some long and short gut cores cut and splicing ferrules fitted and ready to slip in at a moment's notice. The machinery should be given a trial run in ample time before shearing to have any necessary repairs done.

In the check-over one must not forget the shearers' huts and the cook's requirements. Lamps and kerosene, and straw for the mattresses, should not be overlooked, as well as any other little things that go to make a clean and smooth run at shearing.

[N. A. Bowman, Sheep and Wool Expert.

Separated Milk for Pigs

The cash value of separated milk as a pig food is always a matter of great interest to the pig-raising dairy farmer, especially when a change from the sale of cream to the sale of whole milk is being considered.

Apart from national policy on this subject, it is important that the pig-raiser should have a clear picture of the economics involved. Both nutrition and economics are difficult subjects to master, and their mastering is made more difficult by the publication of statements which, even though correct, are incomplete, and so lead to wrong conclusions.

All factors, such as quantities and costs of all foods used, labour, depreciation on equipment, interest on capital, transport and selling costs, and the price of pigs per pound, should be shown and used in arriving at the actual cash value of separated milk under any set of conditions.

In an endeavour to give Victorian farmers a sound general basis on which to calculate the value of their separated milk, the writer published an article in these notes in June, 1941.

The nutritive value of separated milk is wasted in the usual lavish feeding practice. In fact, an excellent human food is wasted in feeding separated milk to pigs at all. In general practice it is estimated that pigs receive about 5 gallons of separated milk, which contains about 5 lb. of valuable dry matter for each pound of dressed pork produced. This pound of dressed pork has a much lower food value than 1 lb. of dried separated milk.

Even so, the basis of common practice, rather than ideal practice, was adopted in the article referred to, because it is often impracticable or uneconomical, on account of seasonal fluctuations of milk supply and the unfavourable ratio between grain and pig prices, to feed the nutritionally ideal proportions of separated milk and grain to pigs

On the arbitrary basis suggested it is calculated that when the price of pigs per pound of dressed weight at auction is 6d., separated milk is worth 0.9d. per gallon; when the price of pigs is 6½d. the separated milk is worth 1d. per gallon, and so on. Each rise or fall of ½d. per pound in the price of pigs would mean one-tenth of a penny a gallon difference in the value of separated milk as a pig food.

It should be realized that the method of calculation is arbitrary, but even so it is a better guide under average existing conditions than are the results obtained from feeding one pen of pigs under one set of conditions.

[L. A. Downey, H.D.A., Pig Expert.

Table Poultry Production

In table poultry production quality is primarily a matter of breeding, feeding, and care. The production of the best table birds depends upon the selection of breeds which will mature and fatten rapidly.

Any variation between the flavour of the several breeds is undoubtedly due to feeding, preparation, and marketing rather than to any difference in breed. Palatability and quality of the flesh are the most practical and important considerations; colour of skin, legs, and feathers are considerations of prejudice. A plump-breasted table bird of good quality will naturally have a better flavour than will a poor bird, but there are often differences amongst birds of the same breed.

In Victoria there is comparatively little specialization in table poultry production, as egg production has been the most profitable branch of poultry-keeping, but opportunities exist for producing table birds as a sideline to egg production.

The most highly developed breeds for egg production are White Leghorns and Australorps. In Victoria the White Leghorn is very popular. It belongs to the Light Breed group, and, though by no means an ideal bird for the table, large numbers are sold locally for this purpose. The cockerels are very seldom up to the desired standard when marketed, though with careful attention and feeding they could be greatly improved. In view of the very high prices being realized for table poultry, which will be maintained for some considerable time, it would pay the poultry farmer to keep all cockerels after sexing and top them off for this class of trade.

The Australorp belongs to a group known as Heavy Breeds. It is classed as a dual-purpose breed—i.e., a good layer and also one suitable for the table—but as a table bird it is not considered to be equal to some of the other heavy breeds which have been specially developed for this purpose. The quality of the cockerels usually marketed also leaves room for improvement.

The table birds mostly favoured in England are heavy breeds, possessing white skin and legs, such as the Sussex, Buff Orpington, and others, or a cross produced by mating an Indian Game male with these breeds.

In the United States of America and Victoria breeds other than those with white skins and legs are equally in demand, such as Rhode Island Reds, Rhode Island Whites, Plymouth Rocks, &c.

In England, sex-linked breeds are being increasingly used, and a popular cross possessing this character is the Rhode Island Red male with Light Sussex females, in which the male chickens carry the plumage of the Light Sussex, and therefore may be separated from the females at the time of hatching. There are many good flocks of Rhode Island Reds in Victoria, and the production of table poultry from this breed and its crosses is recommended.

There is a keen demand for birds in a good finished condition, with good white flesh, abundance of breast meat, and fine bone. The production of birds of this class requires experience. With most heavy birds the feeding of fattening foods for a limited time improves the colour of the flesh greatly, especially if the foods are white.

In the early stages the rearing and feeding of the chickens may be the same as that usually adopted with pullets intended for egg production, although a little higher proportion of dried buttermilk or meat meal could be included in the ration, in order to make their growth as rapid as possible.

Finally, at a suitable age, it is usual to give the birds a short period of intensive fattening. For this purpose they should be confined to small pens or fattening coops for

about two weeks, and trough-fed twice daily on wet mash only. (No grit is required.) Where specialized table poultry production is profitable the following ration, mixed with water to the consistency of thick porridge, is advocated:—

	lb.
Dried milk (skim-milk or buttermilk)	5
Meat meal	5
Ground wheat or barley	30
Ground maize	30
Ground oats (good quality only) ..	30
	100

Ground maize is now unprocurable and dried milk is expensive; but a ration made by mixing 5 lb. of meat meal, 75 lb. of ground wheat or barley, and 20 lb. of ground oats gives very good results.

Liquid milk may be used in place of the dried product or meat meal. Approximately 1 lb. of dried milk or meat meal is equivalent to 1 gallon of separated milk.

The age at which birds classed as chickens are marketed usually varies from about three to five months, depending upon the class of trade for which they are intended and the time of the year when they are in greatest demand.

[H. F. Clinton, Poultry Expert.

Bees

Brood combs will now be showing larger areas of sealed brood, and for the purpose of early queen rearing specially selected colonies should be lightly and regularly fed for stimulating the bees and securing strong colonies early in the season. The advent of pollen increases brood formation, when strong colonies will use up a large amount of their stores. The feeding should be continued until nectar is forthcoming from the fields.

For this stimulative feeding to increase the number of bees, they can be fed with sugar syrup or diluted honey. A good feeder can be made from a 2-lb. treacle-tin, with a dozen small holes made in the lid. This can be inverted and placed in an empty hive body or super immediately above the cluster. Packing should be used round the feeder to conserve warmth within the chamber below.

An important factor, often neglected, is the selection of stock for the rearing of drones to mate with the young queens. Like the male in other stock, the male bee has an important bearing on the progeny. While it is admitted that the necessary mating outside of the hive cannot be absolutely controlled, the mating by undesirable drones can be reduced to a minimum by providing an abundance of young vigorous drones from suitable stock. With this object in view, comb showing a liberal area of drone cells should be inserted in the brood chamber of the hives selected for drone rearing prior to stimulative feeding. Drone brood in other hives should be destroyed with the uncapping knife before hatching.

While justifiable under certain conditions, the practice of brood spreading should not be attempted yet. During this month warm days are selected for opening the hives, and the novice should not be led astray concerning the strength of the colony by noting the expansion of the bees to outside frames and be tempted to insert empty combs in the centre of the brood cluster to speed up brood rearing. This may cause much damage, as, with a fall in temperature, the bees will again converge on the centre to conserve the necessary warmth, and brood that has been removed to the outside when inserting the empty combs may be chilled and perish.

Any colonies found to be queenless can be united with the weaker colonies which have a queen.

Bees removed to the comparative shelter and warmth on the Mornington Peninsula are now working on dwarf banksia. Later a heavy blossoming of coastal ti-tree is expected. The secretion of nectar from coastal ti-tree usually begins during the last week of September, and lasts for one month. It yields fairly heavily, but the honey, while excellent for brood rearing, has a low commercial value.

Beekeepers are again warned that heavy mortality often follows a wet season similar to that just experienced, when surplus thin-bodied honey gathered from grey box and yellow gum has been left in the hives. Condensed atmospheric moisture which is absorbed by this honey may cause it to ferment at the beginning of the warm weather.

[J. W. Thomlinson and W. A. Collins, Apiary Inspectors.

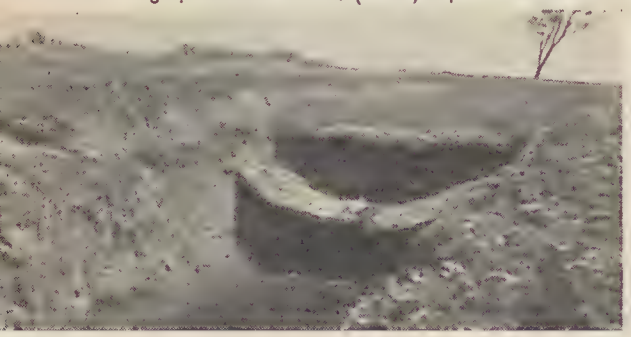
JOIN OR FORM A WAR SAVINGS CERTIFICATE GROUP

The "Cutlift" mows the pasture and loads the bogie

Three bogies are used for continuous working.

Unloading the bogie at the silage pit.

A silage pit almost full and (below) a pit in use.



Hay and Si

The Comi

By A. C. T. HEWITT, M.A

A WELL-IMPROVED farm of the present day carries a considerably greater number of stock than the same farm a generation ago. This is largely due to the establishment of permanent pastures, subdivision of large paddocks, setting aside reserves of fodder from the excess growth of spring, and the adoption generally of modern improved farming methods.

Stock carried now-a-days, in addition to being in greater numbers per acre, are for the most part heavier producers and require a constant supply of food throughout the whole year to hold them in condition and for normal growth. For milk production and fattening the food supply must be greatly increased. This necessitates the maintenance of a regular, amply supply of foodstuffs in all seasons. Such fodder supplies may be acquired most economically by conserving fodder from the farm itself, rather than the expensive practice of buying it in.

In any fodder conservation programme surplus pasture growth must receive first consideration, because it is produced without any special effort or outlay of expenditure as the result of normal farming practices, and will be wasted if not conserved as hay or silage. Hay and silage made from surplus pasture growth can be valued at the cost of conservation, and become the cheapest of conserved fodders available, and also are among the most nutritious.

Pasture supplies the bulk of food for cattle and sheep, and without it dairying, beef production, fat-lamb raising, and wool growing would be unprofitable. Pasture growth is seasonal, and therefore does not supply a sufficiency of nutritious fodder continuously throughout the whole year. In southern and eastern Victoria, the pastures carry an abundance of good quality feed during the spring, but this dries off and loses quality during the summer. By autumn, feed is usually scarce, although seasonal rains start a fresh slow growth which, unless frost-bitten, continues until the spring. This green bite during the winter is inadequate for the stock. In the north, the late autumn, winter, and early spring may be the best seasons, because lack of moisture is the chief limiting factor to growth.

On improved pastures, the luscious spring growth may be 50 times greater than winter growth, while in the dry months there is usually no growth at all.

...age Making

...g Harvest

...c., *Live Stock Science Officer*

With irrigation, the good grazing period is lengthened from early spring until late autumn, but even then the aims of dairy, beef, and sheep farmers who require a constant feed supply are not achieved. In fact, the need for fodder reserves is greater because one advantage of irrigation is to have produce and fat stock out of season, when prices are usually high.

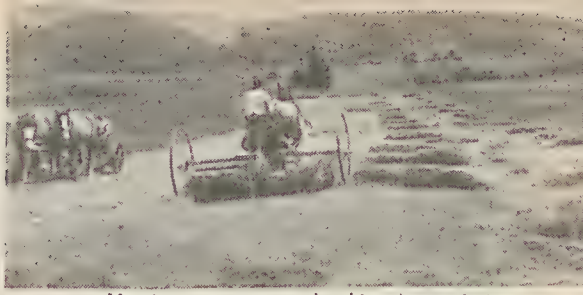
Surplus spring growth left standing in the paddock is inadequate, because it is either leeched of nutrients or rotten when required. Too much old dry feed also may retard autumn growth. It is good farming, therefore, to conserve the surplus spring growth as hay or silage, and feed it when required.

The quantity of fodder to conserve depends largely on local seasonal conditions, but the aim should be to make 2 tons of hay or 5 to 8 tons of silage for each dairy cow each year, half this amount for each beef animal, or 2 cwt. of hay or 5 to 8 cwt. of silage for each sheep. These quantities normally would be in excess of requirements, but a reserve would accumulate for drought years when there would be no surplus fodder to conserve. In drought years, any hay in excess of requirements can be sold at remunerative prices to less provident stock owners.

Hay and silage both have a place in modern farming practice, but hay is by far the more common method of conservation. Hay has advantages in that it requires much less labour to make and later to feed out, and it can be readily transported and marketed. Silage is very heavy to handle. Nearly four times the weight of silage has to be handled to supply the same quantity of nutrients as a given quantity of hay. On the other hand, it has some advantages in that weed growth and crops like maize or sorghums, which do not make good hay, can be conserved in this way, and also that it is affected less by wet weather during harvest, and is fireproof.

Well-made hay and silage are equally nutritious, and the losses of nutrients during conservation are about the same with each product.

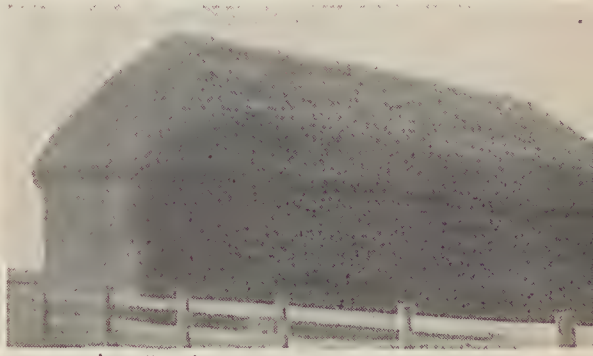
There is little difference between the most favourable time to cut pasture for hay or for silage. The best products are obtained from pasture cut just as the pollen sacks or anthers emerge from the flowers of the principal grass species present.



Mowing a pasture and raking into windrows.

Women assisting with the harvest, Kiewa Valley.

Stack building with the grab-lifter.



A well-built stack and (below) a useful hayshed.

A home-made sweep.

Sweeping hay to press.

Pressing hay on the property of Mr. I. S. Wallace, Kergunyah.

Pasture may be cut slightly earlier or later for both products, but in practice the tendency is to cut a little earlier for silage, and later for hay. A better aftermath is obtained, and it is possible to make better quality hay and silage from earlier cut pasture, but hay cut later is easier to cure on account of longer and warmer days.

A longer harvesting season is obtained if silage is made early, and hay as soon as the pasture is ready. Where both silage and hay are made, silage-making should cease immediately conditions are ready for haymaking, otherwise the hay will be spoilt by cutting the pasture when over-mature. In the absence of elaborate machinery, more nutrients can be conserved as hay than as silage, and with hay a very large area can be cut and raked within a few days of when the pasture is ready. It does not have to be carted immediately it is cut. Much grass is cut far too late, and a coarse, unpalatable product of low food value is obtained. This type of hay, however, is better than insufficient hay, and a considerable proportion may be produced during this and other seasons when labour is scarce, and when the harvesting period is prolonged.

Preparation for the Harvest

As hand feeding will be considerably reduced during August and September, farmers should now calculate how much feed will be required to finish the season so that hay sheds, stack yards, and silage pits may be left tidy and ready for the new season's material. Partly-used stacks should be cut in such a way that the exposed face will be vertical, with no benches left to allow rainwater to enter. Temporary fences around used stacks should be carefully rolled-up in readiness for the new stacks. Harvest-time is a busy period, and all preparations should be made now to avoid any possible delay when it does commence. All harness, mowers, rakes, sweeps, hoists, waggons, frames, presses, engines, forks, and other implements and machinery should be overhauled and put in repair well beforehand.

The paddocks to be cut should be selected so that they can be shut up as soon as the remaining paddocks are growing sufficient feed to carry the farm stock. The fences around the paddocks may require repairing to prevent stock breaking through, trampling the feed, or interfering with harvesting.

Wherever possible, different paddocks should be cut each year. It may be necessary to vary this procedure this season, and cut the paddocks from which the greatest amount of fodder will be obtained with the labour available.

Harvesting Methods

The way in which the pasture crop is harvested depends largely upon the machinery at the disposal of the farmer. The practices shown in the illustrations should require very little extra explanation. The use of the more elaborate plants, such as the "Cutlift," the automatic hay loaders, and the pick-up baler, are beyond the means of small farmers; but, when conditions become settled again, they should be more widely used by larger farmers and contractors.

With the "Cutlift" and five men—one tractor driver, one loading, two bogie drivers,

and one unloading—25 tons of silage can be made in an average eight-hour day.

At "Blackwood" Station, Penshurst, up to 60 tons of chaffed silage have been made in one day with a team of sixteen men, a mower drawn by two horses, four motor trucks, two hay loaders, a blower and tractor (see illustrations on page 412. Without the blower up to 90 tons of pit silage can be made daily, but an additional mower and two horses, or a small tractor for unloading are required.

On smaller farms the most economical method of making pasture silage is to cut the grass with a mower and, with a good crop, sweep it direct to the pit. A light crop is often more easily handled by raking into windrows before sweeping.

Wherever possible the pit should be excavated out of soil which will not readily admit moisture. It should be on the side of a slope, so that it can be drained, and also to allow a dray to be backed in when the silage is being fed out. If the pit is well-drained in this manner, it is not necessary to pile the pasturage much above ground level when making the silage. If the pit is simply a hole in the ground, the silage will have to be lifted out or a ramp made for backing in a cart.

The pit should be about 6 feet deep, and the pasture should be piled up nearly 6 feet above ground level, so that the silage will not be below ground level when it settles. This is necessary to shed the rainwater. If it is to be kept for more than a season, the silage should be covered with 1 foot of earth, but if it is to be used the following season the value of the silage, which deteriorates on top, will be less than the cost of putting on and later removing soil.

Stack silage is satisfactory when used the following season. A grab-lifter is necessary for making stack silage. Round stacks 12 to 16 feet in diameter are convenient sizes, and are large enough to avoid excess deterioration.

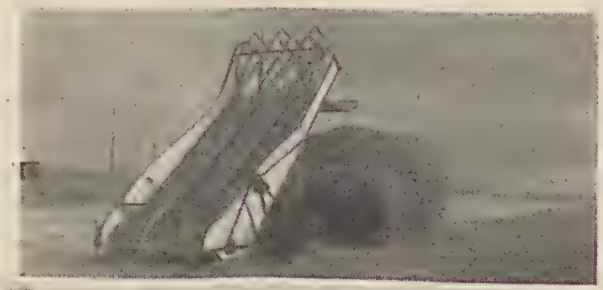
Under present conditions, the addition of molasses to improve silage is not economical.

The usual method of making pasture hay is to cut the pasture with a mower, rake within 24 hours into large windrows, and, as soon as cured, sweep direct to the stack or press. Large windrows protect the hay from light rain, heavy dews, and the bleaching action of the sun. Cocking is unnecessary unless it is impossible to stack or press the hay within a week from cutting. Cocks containing a sweep load of hay are preferable to smaller ones.

Hay is ready to cart when moisture cannot be squeezed out by twisting a small bunch in the hands. Hay stacked at this stage is tough and palatable, with little loss of clover leaves and other more nutritious portions in handling.

After the pasture has been cut and raked into windrows and cured, it is possible to bale 2½ to 3 tons of hay per hour. A team of eight—one sweeping, three forking to feeder, one feeding, two tying the bales, and one stacking—is required.

Hay, if it is to be kept for any length of time, should be stacked on dry foundations under cover, or else in large stacks, which are thatched or covered with tarpaulins. For such stacks a grab-lifter is desirable.



Top—A hay-loader at work.

Left—Making chaff silage at "Blackwood," Penshurst. Right—A 300-ton chaff-silage stack.

Sweeping direct to a small press in the field.

Hay to be fed the following season, and for which there is no shed accommodation, may be stacked by hand. Where the distance of sweeping is short, six men can stack at least 10 tons during a six-hour day between milkings. Three sweeps are necessary, each requiring one man. Two men working together lift the hay with forks on to the stack near where the sixth man, the stack builder, awaits it. Such stacks are usually made about 10 feet wide, and are usually taken to about 9 feet at the eaves. Where neighbouring farmers co-operate it should be possible to get six men to form an efficient team for stacking.

Drays and waggons may be used in place of sweeps, and are suitable for carting hay long distances, but the cost of carting pasture for silage on drays or waggons is prohibitive, unless lifting machinery or very cheap labour is available for loading and unloading.

Size of Stacks and Pits

The size of stack to build can be determined after estimating the quantity of hay in the field. It takes 350 to 600 cubic feet of pasture hay to weigh a ton in a freshly-built stack. A large freshly-built stack of good quality hay will go about 350 cubic feet to the ton, whereas very dry hay in a small stack may measure out at 600 cubic feet to the ton. Stacks built with rain on a rectangular base 10 ft. x 20 ft., and fairly vertical sides and steep tops to shed the 9 feet to the eaves, hold 6 to 8 tons of hay. If taken 12 feet to the eaves they hold 9 to 12 tons of hay, and if taken 15 feet to the eaves 13½ to 18 tons of hay. If the sides spread, more hay will be built into them. After twelve months the stacks will have settled, and then 300 to 400 cubic feet of hay will weigh 1 ton.

Baled pasture hay also varies considerably with the dryness and quality of the hay, and the pressure used in baling. About 200 to 250 cubic feet of good well-pressed hay weighs 1 ton.

After it has settled, about 40 cubic feet of silage weighs 1 ton. Silage in a quickly-filled pit 6 feet deep usually settles to about one-third of its original depth. A stack (or pit) 12 feet high will usually settle to about half of its original height.

An average pasture cuts about 30 cwt. of hay or 6 tons of silage per acre, but yields of 3 tons of hay and 12 tons of silage are not uncommon.

The Cost of Harvesting

Figures obtained from several reliable sources show that it costs 8s. to 10s. per ton to make grass silage in a large way, and 12s. on a smaller scale. Loose hay costs 17s. 6d. to 25s. per ton to harvest, and baled grass hay from 22s. 6d. to 30s. These figures allow the farmer wages and costs for horses and machinery, but are based on efficient going. Even at 30s. per ton the nutrients in grass-hay cost less than ½d. per lb., whereas, at the present time, the nutrients in the cheapest purchasable fodders cost 1d. per lb. Grass-hay is more than twice as cheap as any purchasable fodder, because much of its cost is not directly paid out, but is represented in current farm wages, depreciation, &c.

Although silage costs less per ton, it is more costly per food unit, because 3 to 4 tons of silage are required to supply the same number

of nutrients as 1 ton of hay. The average composition of a number of samples of good pasture hay and silage is as follows:—

	Pasture Hay. (Mixed Grasses and Clovers.) Per cent.	Pasture Silage. (Mixed Grasses and Clovers.) Per cent.
Moisture	16·2	78·4
Dry matter ..	83·8	21·6
Ash	7·2	2·1
Protein	12·1	4·6
Fibre	20·7	6·2
Carbohydrate ..	42·2	7·5
Fat	1·6	1·2

It will be observed that nearly four times the weight of pasture silage has to be handled to supply the same quantity of dry matter as a given quantity of pasture hay.

The difference between the cost of conserving loose and baled hay is small and, considering the convenience of having the hay in bales, the extra cost is warranted.

Wire for baling will be difficult to obtain this year, and, to avoid a shortage, used wires should be straightened and put away for re-use.

For further information on this subject, the reader is referred to reports of various Fodder Conservation Competitions appearing in this and earlier numbers of the *Journal*.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen
Bowran, L. G.	"Glendare," Tallangatta
Bright, George H. ..	Dumbalk
Castle, L. H.	Clarinda
Critten, H. S.	Dumbalk
Dookie Agricultural College	Dookie
Doornbusch, John L. ..	"Starpark," Nhill
Fairchild and Clutterbuck	Tinamba
Geddes, L. D.	Bungaree
Harrison, C. T. ..	"Eastside" Stud, Pomborneit
Hawtin, I. E. and F. ..	"Rossmoyne," Colac
Haywood, Dr. A. R. ..	Hastings
Horn, L. A.	Leongatha North
Longerenong College ..	Dooen
Northcote Children's Farm	Bacchus Marsh
Pietsch, R. E.	Katyil
Rintoul, J. T. C. ..	Glengarry
Roy, W. A.	Morrell's Hill, via Boolarra
Spiers, Albert	Bamawm Extension
State Experiment Farm ..	Rutherglen
Sutherland, R. N. ..	Nullawill
Trenery and Soderlund ..	"Promview," Foster
Trigg, A. J.	Bungaree
Trigg, N. H.	Bullarook
Tweddle, J. T.	"Winlaton," Shepparton
Walch, M. U.	Baring

Seasonal Diseases of Sheep

Pregnancy Toxaemia and Hypocalcaemia

By H. M. ELDER, B.V.Sc.,
Veterinary Officer

TWO common diseases associated with lambing ewes are pregnancy toxaemia and hypocalcaemia. These diseases are similar in some respects, but the former occurs only in ewes advanced in pregnancy, whereas the latter may affect ewes before or after lambing, and also "dry" sheep such as wethers or young sheep.

Pregnancy toxaemia is more common during a dry autumn while hypocalcaemia is more prevalent when there is a luxuriant growth of succulent feed.

PREGNANCY TOXAEMIA

Pregnancy toxaemia is one of the most common causes of mortality in pregnant ewes. It is known also as "twin-lamb" disease because affected ewes are frequently found to be carrying twin lambs. This however, is not always the case, as ewes carrying only a single lamb may be affected.

The disease may occur at any period within about a month prior to lambing. In the early stages, affected ewes appear rather mopey, and walk with a rather stiff, high-stepping gait. They stand by themselves, develop a stupid, aimless appearance, become apparently blind, and walk into obstacles. They grind their teeth, and often show a thick yellowish discharge from the nostrils. After two or three days, they go down, become paralysed, sink into a semi-coma and death occurs in from two to five or six days.

On post-mortem examination, the ewe is found to be carrying one or more well developed lambs. The most noticeable abnormality is the condition of the liver, which is greyish-yellow or putty-coloured, and is very crumbly. The abdominal fat is plentiful, and shows white, flaky patches scattered through it. The heart muscle is very flabby. The paunch is practically empty, and is rather flabby. There is less body fat than would be expected considering the amount of fat in the belly cavity.

Nutrition Important

The disease occurs when there is a falling off in the nutritional value of the feed during pregnancy. It is most common during a dry autumn, when the feed available at the time the ewe is heavy in lamb is less nutritious than during early pregnancy. Following a normally good season, there is good feed at the end of the year, when the ewes are joined with the rams. Even though the feed may be dry, it is of high nutritive value, and the ewes are in good condition.

If there are satisfactory early rains, there is a plentiful growth of green feed before the nutritive value of the dry feed has deteriorated greatly, so that the ewes have sufficient nutritious feed to carry them through to lambing time.

If, however, good rains do not come until late in the season, the dry feed deteriorates throughout the autumn, and even though there is a quantity of dry grass or stubble, and "dry" sheep or wethers may do well on it, there is not sufficient food value in it for ewes heavy in lamb.

This fall in the plane of nutrition during pregnancy is associated with the onset of the disease. Ewes on light feed and only in hard, store condition at mating time and during early pregnancy, are less likely to contract pregnancy toxaemia when there is a dry autumn, than those in fat condition early in pregnancy.

Treatment

Treatment of the disease is not very successful. Drenching twice daily with a cupful of molasses, diluted with an equal quantity of water, may effect a cure in very early cases.

The disease can be prevented, however, by good management. Anything in the nature of a check in the nutritional value of the food during pregnancy should be avoided.

When ewes are on dry feed, this should be supplemented by hand feeding, which should be commenced as soon as the food begins to deteriorate, instead of waiting till some of the flock are affected. Oats, good oaten chaff, good quality grass hay, or lucerne hay are all suitable supplementary fodders.

Where self-feeders or troughs are used, these should be sufficient in number, as, when there is little other feed available, the stronger sheep are inclined to crowd out the weaker ones, which do not get sufficient feed. It is better to draft off the weaker sheep into a separate paddock. Also, with self-feeders the sheep are inclined to congregate around these all day, and do not get sufficient exercise. It is a good plan to have feeders at the opposite end of the paddock to the dam or water supply, so that the sheep obtain exercise by travelling to and fro. If procurable, molasses added to the diet would be of great value in assisting to prevent the disease. If diluted with water, it can be given on chaff or hay, or put out in tubs or kerosene tins. It is not a good idea to give molasses by mixing it with salt, as, to obtain sufficient molasses, the sheep must take too much salt.

Pregnancy toxaemia also occurs in ewes on soft green feed where they obtain insufficient exercise. In a season in which there is a prolific growth of soft green feed in the autumn, the ewes become over-fat during pregnancy, and as they become heavy in lamb, they do not take sufficient exercise. Although the feed is present in quantity, it does not constitute a balanced ration, and the same symptoms develop as when the ewes are on poor dry feed.

To prevent the disease under these circumstances, oaten chaff, meadow hay, or lucerne hay should be given as a supplement to the green feed. Molasses is also useful as an aid to prevention. The ewes should be made to exercise by driving every day. This should be commenced at least six weeks before lambing starts. It should be noted that ewes which have been on good green feed till near lambing, are likely to become affected if suddenly moved on to poorer feed.

The object to be aimed at is to commence with ewes in store condition, and *gradually* improve the plane of nutrition throughout the term of pregnancy.

Do not Confuse with Other Diseases

Pregnancy toxaemia can be easily confused with some other diseases, especially hypocalcaemia. When a number of ewes become sick suddenly, especially after a change of feed, or long travelling, hypocalcaemia is more likely to be the cause.

Consequently, when ewes become sick, it is a good plan to carry out the treatment prescribed for hypocalcaemia.

Worms, especially fine hair worms, also may produce symptoms somewhat resembling those of pregnancy toxaemia. The ewes become weak and go down as though paralyzed. On post-mortem examination, however, it is seen that there is not much abdominal fat and the liver is not discoloured. On making a careful examination, the fine hair worms are found in the fourth stomach and the small intestine. It should be realized that one condition can aggravate the other. Wormy ewes would be prone to develop pregnancy toxaemia because of the drain on the system; and ewes heavy in lamb would suffer more from worm infestation than dry ewes.

Toxaemia jaundice or yellow disease also may be confused with pregnancy toxaemia, the former of course, occurring in dry ewes and wethers as well as in pregnant ewes. Affected animals usually mope about for a few days before going down, but, although sick, they usually are stronger on their legs than in the case of pregnancy toxaemia. On post-mortem examination the liver is seen to be a much brighter yellow, and the skin and fat show a distinct yellow colour.

HYPOCALCAEMIA

Hypocalcaemia may occur in any type of sheep. Though more common in ewes in lamb or with lambs at foot, it also occurs in wethers, virgin ewes, and young sheep.

The onset of the disease is sudden and usually associated with some special factor such as putting sheep on to rank, green feed, especially green crop, droving or trucking long distances, or yarding for a long period without food. Usually numbers of sheep are affected at the one time.

Symptoms

In early stages, affected animals are often seen to be rather staggery in their walk and weak in the hind quarters. They stand about and appear restless and nervous, and have a watery discharge from the nostrils and mouth. The pupil of the eye is widely dilated and the breathing is rapid and panting in nature. They soon go down, often with the back legs extended behind them, and sink into a coma.

Frequently, especially after travelling or yarding, they are first discovered down in a state of collapse.

Post-mortem Appearance

Post-mortem examination shows congestion of the lungs, the liver also is congested, of a blotchy red colour, and exceptionally crumbly. The heart muscle is not flabby as in pregnancy toxaemia. The rumen (or paunch) is usually found to be full of food. These changes, however, are not sufficient in themselves to enable a diagnosis of hypocalcaemia to be made.

Bio-chemical analysis of the blood which shows a marked reduction in the calcium, to one-half or even one-quarter of the normal amount, is necessary for a correct diagnosis.

Treatment

Treatment of pregnant ewes is not very successful as a rule, but with other sheep, better results are achieved.

Ewes with lambs at foot often respond to inflation of the udder with air without further treatment. A useful makeshift for inflating the udder is the metal nipple of a bicycle tube attached to a bicycle pump; or a hypodermic needle with the point filed off may be attached to a rubber tubing on a pump. Any apparatus must be sterilized before inserting into the teat.

If the ewe does not get up soon after inflation of the udder, molasses should be administered two or three times daily, one cupful of molasses mixed with an equal quantity of water being given for each dose. Molasses gives better results than refined treacle.

The same treatment should be tried for ewes in lamb. Obviously, the earlier treatment is commenced, the more hope there is of recovery.

Injections of calcium boro-gluconate do not give satisfactory results in pregnant ewes, but in other sheep such as lactating ewes, dry ewes, and wethers, the results are good. In cases where the sickness is brought on by trucking or droving, recovery after injection is rapid.

Calcium boro-gluconate is a white powder usually dispensed in 2½-oz. packets, and is obtainable from chemists. One packet is sufficient for five sheep. The powder is dissolved in boiled water and injected under the skin. A packet of calcium boro-gluconate should be kept on hand so that it can be tried for treatment immediately sheep become affected. It is used for the treatment of milk-fever in cows also.

Prevention

It is possible to prevent the disease by careful attention to the diet of sheep. Where there is an abnormally prolific growth of green feed, it is better to graze sheep on portion of the property only, and keep the feed on that part under control, than to allow them to graze rank feed over the whole property. Dry feed such as oaten chaff, or oaten or meadow-hay should be given to balance the ration. Molasses may be added to the diet.

Ewes should be compelled to exercise by driving daily if necessary, so that they do not become too fat and sluggish. Hard droving over long distances, however, should be avoided. Sheep should not be yarded or confined in trucks for long periods without food.

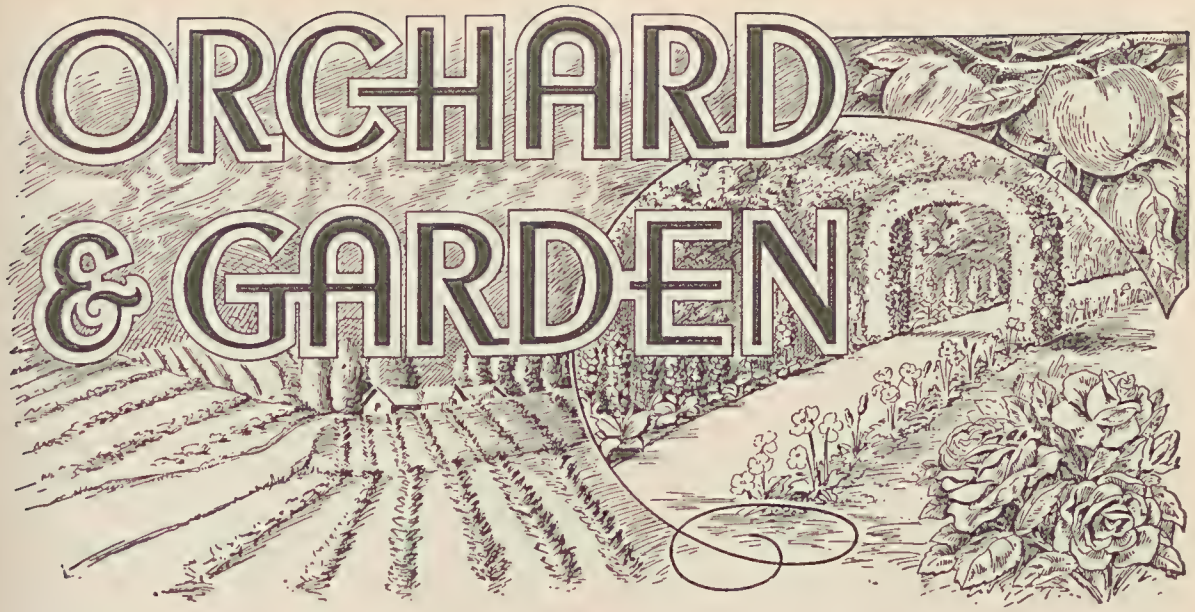
Where hypocalcaemia is suspected, one sick sheep should be killed, and a small bottle of blood collected at the moment of slaughter and forwarded to the Director, Veterinary Research Institute, Parkville—(Spencer-street, Railway Station.) Blood collected after death is of no value.

The internal organs should also be forwarded in 2 per cent. formalin solution.

AUSTRALIA NEEDS NAVY BEANS—*continued from page 406*

Winnowing and Cleaning

Good quality commercial seed must be free from broken, stained or shrivelled (immature) beans and foreign matter. The small farm winnower and grader of the "Little Wonder" type is suitable for cleaning, and grading may not be necessary where the crop has been well grown without check. The cost of cleaning and grading to produce a commercial sample is largely dependent on the care exercised in growing, harvesting, and threshing. Stained and discoloured beans, usually caused by dampness, have to be removed by hand picking or by special seed cleaning machinery in Melbourne. The beans should be packed in clean bags to avoid soiling.



In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

DURING the month of August, signs of commencement of growth will be seen in the appearance of the blossom of the earlier flowering stone fruits. Blossom-time is recognized as the best time for application of fertilizers to orchards. The commonly accepted theory is that fertilizers should be applied at, or slightly before, blossoming so that nutrients will be available to the floral parts and assist in increasing the percentage of blossoms which will set fruit. Experiments conducted throughout the State show that the most important artificial fertilizer for maintaining tree health and increasing the production of apples, pears, peaches, and citrus is sulphate of ammonia. Prior to the war considerable quantities of this fertilizer were imported into Australia, but these supplies are no longer available. Supplies to orchardists have been further reduced by the absorption of locally manufactured sulphate of ammonia into war industries.

It is necessary, therefore, for orchardists to look to some other source of nitrogen supply if they desire to keep their trees in a reasonable state of health and productivity. Fruitgrowers are now limited to the use of animal and vegetable waste products for nitrogen supplies. Farmyard manure is probably the best form of orchard fertilizer. Poultry manure contains the highest proportion of plant nutrients, and, although the composition varies, a typical sample may contain 2 per cent. phosphoric acid, 1·5 per cent. potash, and 2·5 per cent. nitrogen. Supplies of stable, sheep, and cow manure are limited by transport difficulties, but metropolitan growers in particular realise the value of these materials for building up the fertility of their soils. Farmyard manure deteriorates rapidly in storage unless it is protected from rain, which washes out much of the valuable plant foods. Two tons of poultry manure and up to five tons of other forms of animal manures should be applied per acre.

Dried Blood ; Blood and Bone.

Dried blood is the richest organic source of nitrogen, containing twelve per cent., most of which becomes available to the trees. This fertilizer would be particularly valuable for citrus. Blood and bone mixture contains about five per cent. nitrogen and twelve to fourteen per cent. phosphoric acid. Applications of 10 lb. of blood manure or 15/20 lb. of blood and bone should be given to each deciduous tree. Citrus trees may receive increased applications.

Castor Meal.

Only limited supplies of castor meal are available. It contains 5 per cent. nitrogen, 2¼ per cent. phosphoric acid, and 1 per cent. potash. It is a useful source of nitrogen for orchards and should be used at the rate of 15/20 lb. per tree.

Rape Seed Meal.

Rape seed meal contains 5½ per cent. nitrogen, 1¾ per cent. phosphoric acid, and 1½ per cent. potash, and is a valuable fertilizer for orchard use.

Waste Products from Factories.

These waste products would include such substances as wool waste, tannery waste, and waste products from the abattoirs, containing flesh, hair, &c. These various substances contain approximately 8 per cent. of nitrogen in a slowly available form. Growers who intend to buy any of these types of fertilizers may obtain advice as to their value by submitting samples to the Chemist, Department of Agriculture, Melbourne, C.2.

Green Manure.

The growing of leguminous green manure crops is a practice which should be exploited more, because of the contribution such crops make to the soil nitrogen. Fruitgrowers should give this subject some thought so that they can secure supplies of seed, &c., for sowing next autumn.

The collection and composting of all animal and vegetable waste matter which accumulates around a property will provide an additional source of manure for the orchard.

Where an orchard has received adequate supplies of fertilizers over a period of years the present shortage is not likely to be noticed for some time, and normal production could be expected for at least two or three years even if no fertilizers are applied. However few properties are in this fortunate position, and every effort should be made to conserve the soil fertility by the growing of winter crops and cultivating during the summer only sufficiently to control weed growth.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Senior Horticultural Instructor

MANY gardeners will be top-dressing their lawns this month, and a few hints may be useful. Before spreading the soil, the lawn should be heavily raked to loosen the surface slightly, to remove dead grass, and to lift some of the runners. This should be followed by a close mowing. Any areas of lawn which have become compacted and worn by traffic should be loosened with a sharp fork. For top-dressing, choose a sandy soil reasonably free from weeds, particularly tap-rooted weeds like dandelion and flat-weed. Spread the soil evenly and thinly over the surface, except where depressions must be filled up, or where high-spots occur. In these cases, the amount of soil used will be more and less respectively. Do not bury the grass completely, but work the top-dressing into the lawn with the back of the rake so that the blades of grass can still be seen.

In lawns where clovers are troublesome, an application of 1 oz. per square yard of a mixture of three parts of sulphate of ammonia and one part of sulphate of iron will be beneficial. This mixture discourages the growth of clovers and stimulates grasses. It is necessary to give three applications at intervals of four to five weeks. Care should be taken to spread these quickly soluble materials very evenly over the surface and water well afterwards. Only in extreme cases of soil acidity should lime be applied to lawns. Grasses are able to grow quite well on acid soils and this acidity will be unfavourable to the growth of many types of weeds.

Because of labour difficulties more interest is being taken in hardy perennials, and some of the following plants will be found very useful. When once established they require little attention apart from watering, weeding, and mulching.

Some Hardy Perennials

Aquilegia—more often called Columbine—is an old favourite which prefers partial shade from the hot afternoon sun. Many good varieties, having very fine colours and large blooms with long spurs, are available among the Scott Elliott and Dobbies Imperial hybrids. Seed may be sown now where the plants are to remain, or plants, obtained by division of the older crowns, may be planted. If seedlings are raised in seed-beds, they should be

transplanted to their permanent positions while they are still small. This avoids injury to the fleshy tap-roots which develop as the seedling grows.

Astilbe—sometimes called Spiraea and Meadow-Sweet, produces its best effects when planted in masses in moist, rich soil, in partial shade. Do not allow this plant to become dry in summer. It is propagated by division of the older plants in early spring, and the bronze-coloured foliage when it first appears is very attractive. This is followed by tall, feathery spikes of pink or white flowers growing to a height of 3 feet. This plant also makes a useful pot plant in the fernery or glass-house. Several good varieties are available—Bonn, a carmine-pink, Fanal, a deep crimson, and Hyacinth, a bright lilac.

Erigeron—the Star Wort. The flower closely resembles a small single aster. The plant is very free-flowering over a long period, and can be propagated by division of the clumps. It is hardy and enjoys a sunny position. The flowers are useful for cutting. Two good varieties are Amos Perry, with a large soft lilac flower, and Quakeress, a rich rose-lilac colour.

Campanula is a summer and autumn-flowering plant in which the foliage forms a clustered clump close to the soil, and the blue, pendulous, bell-shaped flowers are borne on medium length stems about 2 to 3 feet high. This plant likes a moist, cool situation with partial shade over the clump of leaves. Sufficient shade can be provided by other tall-growing perennials planted nearby. The two out-standing varieties of *Campanula persicifolia* are "Kingfisher" and "Telham Beauty." Divisions of the old clumps may be planted now.

Shasta Daisy, which is really a chrysanthemum, is a very popular garden and cut-flower. Undoubtedly the best pure white is "Esther Read," with its large double flowers so plentiful in summer. It is particularly useful for decoration at Christmas. "Maximum" is a pure white with a golden centre. Divisions of older plants planted now will become established quickly.

Daphne.—Throughout the winter this attractive and popular shrub has been producing its fragrant pink and white flowers. The daphne grows best in a sheltered position in partial shade, in a cool moist soil. It does not like its root-system to be disturbed by cultivation, and its manurial requirements will be met by a few handfuls of blood and bone manure scattered around the bush now and lightly hoed. A mulch of leaf-mould or well-decayed manure in November will assist in keeping the surface soil cool and moist during summer.

THE VEGETABLE GARDEN

Peas.—Another sowing of peas can be made this month. "William Massey" is a quick-maturing variety which grows to a height of about 18 inches and is very suitable for a spring crop. It is prolific, and yields two or three good pickings. The pods are bright green and well filled. This variety should be preferred to "Greenfeast" where wet soil conditions are found.

"Greenfeast," one of the most popular market varieties of garden peas, grows taller than "William Massey," often reaching a height of 30 inches, and is a little longer coming to maturity. Good results are obtained from this variety by growing it on a wire trellis.

The cropping area of garden peas is increased, and cultural work is more easily carried out when supports are provided. Split palings, bamboos, or old wire-netting supported by stakes, 2 to 3 feet high, will be found most useful. Details of the method of planting will be found in the vegetable notes published in the July issue of the *Journal.*

Parsnips.—Parsnips require deep soil, and do best when grown in soils which have been heavily manured for a previous crop. The seed, which is rather slow to germinate, should be sown in drills about 15 inches apart and covered with $\frac{1}{2}$ to $\frac{3}{4}$ of an inch of soil. Later the plants can be thinned to 3 to 4 inches apart. "Hollow Crown" is still the most popular variety.

Turnips.—Seed of "White Stone" or "Purple Top" turnip and "Champion Purple Top" Swede turnip may be sown in drills in their permanent position. Turnip seed should be sown about $\frac{1}{2}$ inch deep in rows spaced about 14 to 18 inches apart, and plants later thinned to 3 to 5 inches apart. Swedes require a little more room, and the rows should be spaced 18 inches to 2 feet apart with 5 to 8 inches between the plants.

Potatoes.—Early potatoes can be planted about the middle of this month. If planted earlier than this, there is a danger that frosts will injure the plants. Suitable early varieties are No. 1 Carman, Earliest of All, and Katahdin. A tuber about 3 oz. in weight or about the size of a small tennis ball, is the best sized "set" to use. Large tubers may be cut longitudinally. Plant about 4½ inches to 5 inches deep, in rows 24 inches apart and 14 inches between the plants. After planting, hoe the beds and keep the surface soil stirred regularly to suppress weeds.

Vegetable Planting Guide for Victoria

By F. A. MAHER, B.Agr.Sc., Assistant Horticultural Research Officer

THE rapid expansion of the vegetable growing industry in Victoria has brought many new producers into that field. The accompanying planting guide has been prepared mainly for the use of intending commercial vegetable growers and sets down the periods of the year during which the establishment of vegetable crops is most likely to be successful.

The State has been divided into three main zones (see map), in each of which planting periods are generally similar.

This division is of necessity broad, and there are small areas within each zone which differ from the general conditions of that zone. Local experience will indicate such areas.

The table sets down the distance between rows, distance between plants within the row, depth of seeding, and amount of seed or sets required per acre for each crop.

These planting distances have been found satisfactory for the various crops when grown under natural rainfall conditions or irrigated by overhead spray systems.

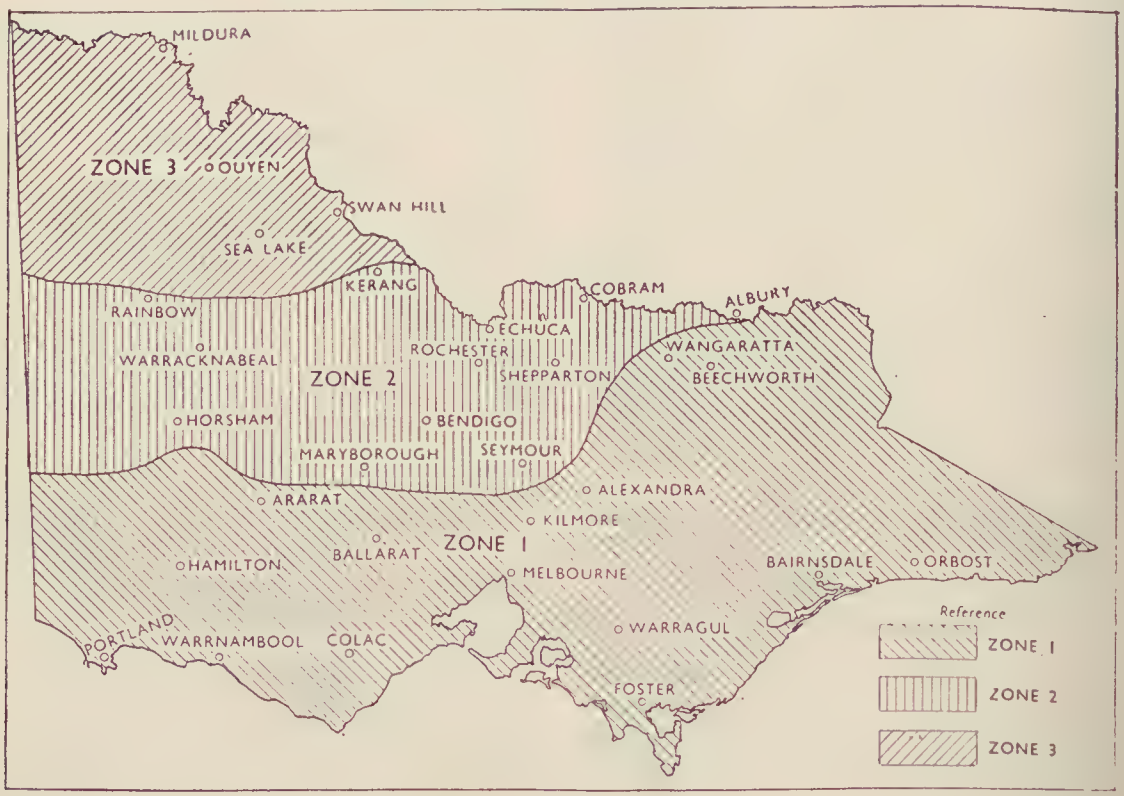
Where furrow irrigation is adopted, and where crops are cultivated by horse drawn implements, the distances between rows will have to be adjusted to meet these requirements.

In view of the present seed shortage, seeding should be carried out very carefully, the amount used per acre being reduced to the lower figure indicated in the "seed per acre" table.

In a table of this type, it is not possible to include all of the commonly used varieties of the various vegetable crops, and in most instances, only the more outstanding varieties have been included.

There are many excellent private strains being cultivated by commercial growers, and while most of these strains are valuable, they have been omitted because seed is not available on the open market.

For those producing for canning purposes, the varieties of outstanding canning quality have been indicated.



PLANTING TABLE FOR VEGETABLE CROPS IN VICTORIA

Crop.	Variety.	Zone 1.		Zone 2.		Zone 3.		Distance between Rows.	Distance between Plants.	Depth of Sowing.	Seed per Acre.
		Sow Seed.	Transplant.	Sow Seed.	Transplant.	Sow Seed.	Transplant.				
								Inches.	Inches.	Inches.	
BRASSICAS (LEAF CROPS).											
CABBAGE ..	Golden Acre ..	Sept. ..	Late Nov. ..	Dec., Jan. ..	Feb., early March	Not suitable	Not suitable	30	18–24	½–¾	6 oz.
	Copenhagen Market										
	St. John's Day (Early)										
	*Early Jersey Wakefield	Aug. to early Nov.	Late Oct. to Jan.	Not suitable	Not suitable	Not suitable	Not suitable	30	18–24	,,	,,
	Succession (Henderson's)	Aug. to early Nov.	Late Oct. to Jan.	Jan. to Mar.	Late Feb. to early May	Early Jan. to Feb.	Mar., April..	30–36	30	,,	,,
	Drumhead ..	Nov., Dec.	Jan. to Mar.	Jan. to Mar.	Late Feb. to early May	Feb. ..	Early April	30–36	24	,,	,,
	All head (early) ..										
	Enkhuizen Glory ..										
	East Ham ..	Late Jan...	Mar., April..	Feb. ..	April ..	Late Feb. ..	Late April ..	30	24	,,	,,
	Savoy										
	Parisian	May and June ..	July and Aug.	Mar., early April ..	May, early June	Late Feb. ..	April ..	30	24	,,	,,
	Full Irish ..										
	* Aphis Proof ..	Late Sept., Oct.	Nov., Dec. ..	Oct., Nov. ..	Dec., Jan. ..	Nov. ..	Jan. ..	30	24	,,	,,
CAULIFLOWER ..	Prize Red (Pickling)	Early Feb. ..	April ..	Mar. ..	May ..	Not suitable	Not suitable	30	18–24	,,	,,
	Early Snowball ..	Late Nov. ..	Late Jan. ..	Late Dec. ..	Late Feb. ..	Not suitable	Not suitable	36	30–36	¼–½	4 oz.
	*Early Green Glazed	Late Nov. ..	Late Jan. ..	Late Dec. ..	Late Feb. ..	Jan. ..	March ..	36	30	,,	,,
	Early Eclipse ..	Mid Dec. to late Dec.	Mid. Feb. ..	Jan. ..	March ..	Early Feb.	Early April	36	30	,,	,,
	Clements ..										
	Phenomenal Maincrop	Jan. ..	Early March	Late Jan. ..	Late March	Feb. ..	April ..	36	30	,,	,,
	Rookes										
	Late Metropole ..	Feb. ..	Mid to late April	Early Feb...	Early April	Late Feb. ..	Late April ..	36	30	,,	,,
BRUSSELS SPROUT	Fillbasket ..	Late Oct. to Dec.	Jan. to early March	Not suitable	Not suitable	Not suitable	Not suitable	30–36	24	,,	,,
	Covent Garden ..										
	Yates's Champion..										
BROCCOLI ..	Green Sprouting ..	Sept. to Nov.	Nov. to Jan.	Not suitable	Not suitable	Not suitable	Not suitable	30	30	½–½	,,
	Late White ..										
CHINESE CABBAGE	Pe-Tsai	Nov. to Feb.	Thin out ..	Oct. to Feb.	Thin out ..	Jan., Feb. ..	Thin out ..	18–28	15–20	½–¾	4–6 oz
	Wong Bok ..										
GREENS.											
KALE (Borecole) ..	Dwarf Green Curled	Feb., Mar. ..	April, May ..	Mar. ..	Early May	Not suitable	Not suitable	30	24	½–¾	Seed bed, 8 oz. Drilled, 2 lb.
SPINACH ..	Prickly Seeded (Winter)	Feb. to May	Thin out ..	Mar. to May	Thin out ..	April, May ..	Thin out ..	12–18	4–6	,,	8–10 lb
	Round Seeded (Summer)	Sept., Oct.	Thin out ..	Aug., Sept.	Thin out ..	July, Aug...	Thin out ..				
SILVER BEET ..	New Zealand Spinach	Sept., Oct...	Nov., Dec. ..	Sept. ..	Nov. ..	Aug. to Dec.	Oct. to Feb.	36–48	24	1	15 lb.
	†Fordhook Giant ..	Jan. to Mar. and Aug., Sept.	Mar. to May, and Oct., Nov. ..	Feb. to late April	Late Mar. to late Sept.	Mar., April..	May, June ..	18–24	9–12	¾–1	6–8 lb.
	Dark Green Broad Ribbed										
	Lucullus										

* Home-garden varieties.——† Outstanding canning or bottling varieties.——‡ Staking varieties.——§ Frost-sensitive crops.

PLANTING TABLE FOR VEGETABLE CROPS IN VICTORIA—*continued*

Crop.	Variety.	Zone 1.		Zone 2.		Zone 3.		Distance between Rows.	Distance between Plants.	Depth of Sowing.	Seed per Acre.
		Sow Seed.	Transplant.	Sow Seed.	Transplant.	Sow Seed.	Transplant.				
								Inches.	Inches.	Inches.	
				SALAD CROPS.							
LETTUCE—											
Autumn and Summer	Imperial 847 ..	Oct. to Jan.	Nov. to Feb.	Nov. to Feb.	Late Dec. to late Jan.	Aug., Sept.	Late Sept. to late Oct.	12–18	12	½–¾	3 lb.
	Imperial 850 ..										
Winter	New York ..										
	Imperial D ..	Mar., April	Late April to late May	April, May ..	May, June ..	April, May ..	May, June ..	12–18	10	,,	,,
	Webb's Wonderful										
Spring	Imperial 615 ..	May, June ..	June, July ..	June ..	July, Aug. ..	May, June ..	June, July ..	12–18	12	,,	,,
Summer ..	Imperial 44 ..										
	Iceberg	Late Sept. to late Nov.	Early Nov. to late Dec.	Aug. ..	Sept., Oct...	July, Aug. ..	Aug., Sept...	12–18	12	,,	,,
	Mignonette ..										
ENDIVE ..	Green Curled ..	Jan., Feb.	Mar., April..	Mar., April..	May, June ..	April ..	June ..	12–18	10–12	½	4 lb.
CELERY	Full Heart Batavian										
	Golden Plume ..										
	Export White (South Australian)	Jan., Feb.	Mar. to May	Feb., Mar. ..	April to June	Not suitable	Not suitable	36	6–8	½	4 oz.
	Golden Self Blanching										
§TOMATO—											
Early	Burwood Wonder ..										
	South Australian Dwarf	Aug., Sept.	Oct., Nov. ..	Late June, early July	Sept., Oct...	June, July ..	Late Aug., Sept.	36–42	24	½	1½–2 oz.
	Rouge de Marmande										
	‡Sunnybrook Earliana										
§Second Early ..	†Tatura Dwarf Globe	Sept. ..	Nov., Dec.	Late July, early Aug.	Late Sept. to mid Oct.	Aug. ..	Oct. ..	36–48	24 30	,,	,,
	‡Red Marhio ..										
§Late	Walker's Recruit ..	Oct. ..	Dec. ..	Not suitable	Not suitable	Not suitable	Not suitable	36–48	24	,,	,,
	Mortgage Lifter ..	Oct. ..	Dec. ..	Not suitable	Not suitable	Not suitable	Not suitable	42–60	24	,,	,,
§Early and Late ..	‡Sensation ..	Oct. ..	Dec. ..	Early July ..	Oct. ..	June ..	Late Aug. ..	36–48	18 24	,,	,,
				LEGUMES.							
§BEAN—											
§Dwarf French ..	Canadian Wonder ..	Early Oct. to late Jan.	..	Early Sept. to late Jan.	..	Early Sept. to Feb.	..	18–36	4–5	1–2	40–60 lb.
	Brown Beauty ..										
	*Negro Long Pod ..										
	Emperor William ..										
§Butter or Waxpod	Startler Wax ..	Oct. to early Feb.	..	Early Sept. to Feb.	..	Early Sept. to Feb.	..	18–36	3–4	,,	,,
§Runner	†Epicure	Oct. to Dec.	..	Sept. to Jan.	..	Sept. to early Feb.	..	30–36	9	,,	30–40 lb.
	†Kentucky Wonder (White seeded)										
	General McCay ..										
	†Fardeulosa ..										
	*Scarlet Runner ..										
Broad Bean ..	Coles Dwarf Prolific	Mar. to early May	..	Feb. to May	..	Mar. to June	..	24	9	2–2½	60–90 lb.
	Leviathan Longpod										
PEA—											
Early	English Wonder ..	May to Sept.	..	Feb. to May.	..	Mar. to May	..	14–21	2–2½	1½–2	90–180 lb
	William Massey Synonymous, Melbourne Market)										
Early and Midseason	Greenfeast ..	July to Dec.	..	June to Dec.	..	June to Feb.	..	,,	,,	,,	,,
Midseason ..	Richard Seddon ..	Aug., Sept.	..	July to Sept.	..	Not suitable	..	,,	,,	,,	,,
Late	Yorkshire Hero ..	Nov. to Feb.	..	Nov. to Feb.	..	Sept., Oct.	..	,,	,,	,,	,,
	Alderman (tall type)										
Canning ..	†Canners' Perfection	Aug., Sept.	..	July to Sept.	..	July., Aug...	..	7–9	,,	,,	240–300 lb.

BULB CROPS.

ONION—											
Non Keeping ..	Silverskin ..	Feb., Mar.	April, May ..	Feb., Mar. ..	April, May ..	April to early June	June, July ..	8–10	3–4	½–¾	2–4 lb.
	Early Barletta ..										
	Australian White ..										
	Queen										
	Early Brown Globe ..	Mar., April	May and early June	Mar., April ..	May, June ..	April to June	June, July ..	,,	,,	,,	,,
	Odourless ..										
Long Keeping ..	Victorian Brown ..	In seed bed, April, May	June, July ..	May and June	Thin out ..	May, June ..	Thin out ..	,,	,,	,,	,,
	Brown Spanish ..										
	White Imperial Spanish ..	Drilled in June, July	Thinned when 4"–5" high								
SPRING ONION ..	White Lisbon ..	Feb. to April	..	Mar., April ..	..	April to June	..	8–10	½	,,	10–15 lb.
LEEK	Mussleburgh ..	April to July	June to late Sept.	March to June	May to Aug.	March ..	May ..	15–24	5–6	,,	3–4 lb.
	London Flag ..									,,	

ROOT CROPS.

CARROT	†Red Cored Chantenay	Dec., early Jan.; May; late July to late Oct.	..	Oct. Nov. and Jan. to late Mar.	..	Late April to June, and July to Oct.	..	10–24	2–3	½–¾	2–4 lb.
	Danvers Half Long ..										
	St. Valery ..										
	Short Horn ..										
	Manchester Table ..										
PARSNIP ..	Hollow Crown (Victorian strain) ..	May and early Aug. to late Dec.	..	Dec., Jan., and late July to late Sept.	..	Late April to June and Aug. to Oct.	..	15–24	3–4	,,	5–7 lb.
	Student										
RED BEET ..	Crosby's Egyptian ..	Jan. to mid Mar. and June to Oct.	..	Jan. to late Mar. and late Aug. to Oct.	..	Late Mar. to late May and July to Sept.	..	10–24	2½–3½	¾–1	6–8 lb.
	Early Wonder ..										
	†Detroit Dark Red ..										
	Crimson Globe ..										

BRASSICAS (Root Crops).

TURNIP—											
White	White Stone ..	Jan., Feb., and late July to Oct.	..	Feb. to July	..	Mar. to July	..	12–24	3–4	½–¾	2–3 lb.
	Purple Top Munich ..										
Swede	Champion Purple Top	Jan. to early Mar.	..	Feb. to mid April	..	Late April, May	..	18–24	4–8	½–¾	2–2½ lb.
	Wintergreen Green Top										
KOHL RABI ..	Early Purple ..	Jan. to Mar.	Mar. to May	Feb., Mar. ..	April, May ..	Mar. ..	May ..	15–20	5–6	½	2–3 lb.
RADISH	Early Green ..										
	White Icicle ..										
	Early Long Scarlet ..	Feb. to Nov.	..	Feb. to late Sept.	..	Mar. to Aug.	..	10–14	1½–2	½–¾	8–10 lb.
	French Breakfast ..										

ROOT CROPS (Tuberous).

§POTATO—											
§Early	No. 1 Carman ..	Mid June to Sept. (frost-free localities)	..	Mid June to Sept. (frost-free localities)	..	July to Sept. (frost-free localities)	..	27	13–14	4½–5	12 cwt. (average sized sets)
	Manistee										
	Earliest of All ..										
	Katahdin ..										
Maincrop ..	Up-to-Date ..										
	No. 3 Carman ..	Oct. to Dec.	..	Sept. to early Nov.	..	Sept. to Nov.	..	27	15–16	4½–5	12 cwt. (average sized sets)
	Brownell ..										
	Snowflake ..										

• Home-garden varieties.——† Outstanding canning or bottling varieties.——‡ Staking varieties.——§ Frost-sensitive crops.

PLANTING TABLE FOR VEGETABLE CROPS IN VICTORIA—*continued*

Crop.	Variety.	Zone 1.		Zone 2.		Zone 3.		Distance between Rows.	Distance between Plants.	Depth of Sowing.	Seed per Acre.
		Sow Seed.	Transplant.	Sow Seed.	Transplant.	Sow Seed.	Transplant.				
								Inches.	Inches.	Inches.	
PERENNIAL CROPS.											
ASPARAGUS ..	†Connover's Colossal †Mary Washington	Aug., Sept.	June to Aug. (2-year-old seedlings)	July to Sept.	June to Aug. (2-year-old seedlings)	July, Aug. ..	June, July (2-year-old seedlings)	72–84	18	½–¾	4 lb.
§CHOKO ..	Cream Fruited ..	Not suitable	Not suitable	Not suitable	Not suitable	Early Sept. to mid Oct. (Plant fruits)	Aug. to late Sept. (Roots)	108–120 (On trellis)	30–36	3–4	1,600 fruits
RHUBARB ..	Keck's Prolific .. †Stone's Early Ruby Early Albert ..	Oct., Nov.	May to Aug. (Crowns and 2-year-old seedlings)	Aug., Sept.	May to Sept. (Crowns and 2-year-old seedlings)	July, Aug. ..	April to early Aug. (Crowns and 2-year-old seedlings)	36–48	24–42	½–¾ (Crowns, 4")	12 oz.

Crop.	Variety.	Zone 1.		Zone 2.		Zone 3.	Plants per Hill.	Distance between Rows.	Distance between Hills.	Depth of Sowing.	Seed per Acre. (Approx.).
		Sow Seed.	Transplant.	Sow Seed.	Transplant.	Sow Seed.					
								Inches.	Inches.	Inches.	lb.
CUCURBITS.											
CUCUMBER ..	Early Fortune .. Long Green Prickly Vaughan .. Crystal Apple ..	Early Oct. to Dec.	..	Sept. to Dec.	..	Late Aug. to late Dec.	2–3	48–72	36–48	1–1½	2
§GHERKIN ..	Heinz Pickling .. Extra Early Green Prolific	Early Oct. to Dec.	..	Sept. to Dec.	..	Late Aug. to Dec.	„	48–72	36	„	„
§MARROW ..	Long White Bush Long White Running Zucchini	Late Sept. to Dec.	..	Sept. to Dec.	..	Late Aug. to Dec.	1–2 2–3 1–2	36–48 96–120 36–48	30–42 60–72 30–42	„ „ „	3–4 2–3 3–4
§PUMPKIN ..	Turk's Cap .. Triamble .. (Beaudesert) .. Queensland Blue .. Ironbark	Early Oct. to Dec.	..	Sept. to Dec.	..	Late Aug. to Dec.	2–3	84–96	72–84	1–2	2–3
§SQUASH ..											
Long Keeping	Table Queen .. Green Hubbard .. Warted Hubbard .. Fordhook ..	Early Oct. to Dec.	..	Sept. to Dec.	..	Aug. to Dec.	„	84–120	72–84	1–1½	„
Non-Keeping ..	Early White Bush Early Golden Bush Summer Crookneck	Early Oct. to Dec.	..	Sept. to Dec.	..	Aug. to Dec.	1–2	48–60	36–54	„	3–5
§GRAMMA ..	Bugle Gramma .. Trombone ..	Early Oct. to Dec.	..	Sept. to Dec.	..	Aug. to Dec.	2–3	84–120	72–84	„	3–4
§ROCKMELON ..	Hale's Best ..										
Cantaloupe	Powdery Mildew Resistant No. 45 Rocky Ford ..	Not suitable	Not suitable	Oct. to late Nov.	..	Sept. to early Dec.	3–4	72–84	48–60	„	1½–2½
Winter types ..	Honey Dew .. California Cream ..										
§WATERMELON ..	Yate's Early .. Angelino ..										
	Hawkesbury Wilt Resistant .. Cannon Ball .. Kleckley Swee t ..	Late Oct. to Nov.	..	Early Oct. to late Nov.	..	Sept. to early Dec.	„	96–144	72–120	1–2	2–3
§PRES. MELON	Red Seeded Citron	Oct. to Nov.	..	Oct. to Nov.	..	Sept. to Dec.	„	„	72–96	„	„

Crop.	Variety.	Zone 1.		Zone 2.		Zone 3.		Distance between Rows.	Distance between Plants.	Depth of Sowing.	Seed per Acre.
		Sow Seed.	Transplant.	Sow Seed.	Transplant.	Sow Seed.	Transplant.				
								Inches.	Inches.	Inches.	
OTHER CROPS.											
ARTICHOKE— Jerusalem ..	Mammoth White ..	June to Aug. (tubers)	..	May to July	..	April to July	..	36	15–18	5–6	6–8 cwt.
Globe	Large Purple .. Large Green Globe	Sept., Oct.	Sept. to Nov. (suckers)	..	Aug. to Nov. (suckers)	..	May to late Sept. (suckers)	48	36		Use suckers 360C/acre
CELERIAC ..	..	Mar., April..	May, June	Mar. to May	May to July	Not suitable	Not suitable	15–18	12	¼–½	12–16 oz.
§EGG PLANT ..	Black Beauty .. New York Spineless	Not suitable	Not suitable	Not suitable	Not suitable	Sept., Oct.	Nov., Dec.	30–42	24–30	¼–½	6 oz.
GARLIC	Italian Type ..	..	April, May (Cloves)	..	May, June (Cloves)	Not suitable	Not suitable	12–15	4–6	1–2	4 cwt. (Cloves)
§OKRA	Long Green ..	Sept., Oct.	Nov., Dec.	Aug., Sept.	Oct., Nov. ..	Aug. to Oct.	Oct. to Dec.	42–48	16–20	1	2½ lb.
SHALLOT ..	French Shallot ..	..	Feb. to April (Bulbs)	..	March to May (Bulbs)	..	April to early June (Bulbs)	12–15	4–6	1–2	2½ tons
§PEPPER Mild	Ruby King .. Bull Nose ..	Sept., Oct.	Oct., Nov. ..	July, Aug.	Sept., Oct.	July to Sept.	Sept. to Nov.	36–48	24	½	6 oz.
Pungent ..	Small Red Chili .. Long Red Cayenne	Sept., Oct.	Oct., Nov. ..	July, Aug.	Sept., Oct.	July to Sept.	Sept. to Nov.	36	18–24	,,	,,
SALSIFY ..	Mammoth Sandwich Island	Dec., Jan. ..	..	Nov. to Feb.	..	Nov. to April	..	18–24	2–4	,,	6–8 lb.
SEA KALE ..	Ivory White ..	May, June	One year old seedlings, Aug. and Sept.; sprouted roots, July, Aug.)	Not suitable	Not suitable	Not suitable	Not suitable	36–48 (Roots and one year old seedlings)	36 (Groups of three plants)	Seed ½ Roots 3	4 oz.
§SWEET CORN ..	†Golden Cross Bantam .. Golden Bantam .. †Country Gentleman Stowell's Evergreen	Late Sept. to Nov.	..	Late Aug. to early Dec.	..	Aug. to Dec.	..	30–36	In rows 12–18 Hills of 3 plants 30–36	¾–1½	8–12 lb.
HERBS.											
PARSLEY ..	Triple Curled .. Dwarf Perfection ..	Autumn and Spring	Late autumn and late Spring	Autumn and Spring	Autumn and Spring	Late autumn early Spring	Winter and Spring	12–18	9	¼–½	4 lb.
MINT	Spearmint ..	Autumn and Spring	Root divisions and seedlings, Aug., Sept.	Autumn and Spring	Root divisions and seedlings, Autumn and Spring	Autumn and Spring	Root divisions and seedlings, Winter and and Spring	36	Continuous line	½	4–6 lb.

"Other Herbs," see Departmental free leaflet on Herb Culture.

* Home-garden varieties.——† Outstanding canning or bottling varieties.——‡ Staking varieties.——§ Frost-sensitive cops.

PASTURE INVESTIGATIONS—continued from page 392

In the first year there was the usual growth of volunteer weed species, and yields obtained during 1939 are not truly representative of the sown species. The following year was rather dry and yields generally were poor, but the "Phalaris-sub. clover" mixture gave two to three times as much herbage as the "rye grass-subterranean clover" mixtures. In 1941 conditions for growth were better and yields from all plots were higher, but again the "rye grass-sub. clover" combination was out-yielded. Botanical analyses of the herbage from time to time showed that there was much more subterranean clover on the strips sown with "Phalaris" than on those sown with perennial rye grass, and this agrees with observations made on the larger species trials at the three centres in the North-East, viz., that perennial rye grass suppresses the development of the subterranean clover under northern conditions.

Manure applied to this species production trial was 2 cwt. of "super."/ac. in 1939, 2 cwt. of "super." in 1940, and in 1941 1 cwt. of "super." and 1 cwt. of muriate of potash. It is interesting to note that in 1940 and 1941 the annual yields from the "phalaris-sub." plots were higher, and the "perennial rye-sub." plots lower than adjoining strips of pure subterranean clover receiving a very similar treatment in the mowing manurial trial.

The annual yields from plots harrowed and rolled after sowing have been consistently better than from those harrowed only.

TABLE 11.—MANURIAL TRIAL AT WANGARATTA —(S. D. WEBB)

Total Annual Yields of Greenstuff in cwt. per Acre

Year.	Nil.	P½.	P1.	P2.	P2. K1.	P2. K1. Ca20.	P2. Ca20.	P3.
1939	253	341	408	477	486	484	468	501
1940	43	86	132	179	188	176	158	172
1941	30	69	125	174	175	198	187	179

TABLE 12.—MANURIAL TRIAL AT YERING— (J. W. READE)

Total Annual Yields of Greenstuff in cwt. per Acre

Year.	Nil.	P½.	P1.	P2.	P2. K1.	P2. K1. Ca20.	P2. Ca20.	P3.
1939	280	295	318	326	358	398	362	326
1940	116	127	133	138	180	196	138	134
1941	158	190	217	219	312	315	208	193

TABLE 13.—MANURIAL TRIAL AT COLDSTREAM —(J. P. DOAKE)

Total Annual Yields of Greenstuff in cwt. per Acre

Year.	Nil.	P½.	P1.	P2.	P2. K1.	P2. K1. Ca20.	P2. Ca20.	P3.
1939	217	222	231	241	269	303	287	258
1940	68	72	87	96	115	172	138	104
1941	99	118	155	189	200	252	214	182

A strong pasture of Phalaris tuberosa and subterranean clover in the Kiewa Valley.

Millet growing at Kerang. The sterile patches are due to "salt".

RECLAMATION TRIALS ON SALTY LAND IN THE KERANG DISTRICT

Certain areas in the northern irrigation districts have become almost barren as a result of an excessive accumulation of alkali in the surface soil. This high concentration of "salt" is closely related to the raising of the water table, and has been largely brought about by faulty irrigation practice, although overgrazing, lack of manuring, floods, and droughts have all been contributing factors. Cohuna and Kerang districts are notable examples, but at Cohuna particularly badly affected land has been effectively reclaimed and much of it bears luxuriant pastures.

In reclaiming salt-affected land, it is important to lower the ground water level, and this necessitates the application of sound irrigation methods. The growth of herbage of some kind or another is also very beneficial in keeping the water table down, and to encourage growth it is necessary to offset the natural deficiency of phosphate by using "super.".

It was with the object of obtaining precise information on the subject of reclamation that four experimental plots each of ten acres were selected and trials begun in 1939.

Kerang East—(Mr. A. C. Kerr)

The soil type in this area is classified as "red plain," and the depth of the water table varies from 2 ft. to 3 ft. 6 in. Reclamation is difficult as even unaffected land of this type is low in natural fertility and dries out very readily, making conditions very difficult for the maintenance of those perennial species that ordinarily can be grown under irrigated conditions.

Grading was commenced in 1939, and the block was put into fair order by the end of the season. In the following year some sections were sown in the autumn to various pasture mixtures and to oats and barley and other parts in the spring to millet. The results from the cereals were poor, but the pasture mixtures gave good establishments and have improved since.

Further sowings to pasture mixtures were made in the autumn of 1941, but the season was dry and except where millet had been growing previously, involving summer watering, results were disappointing. While the summer irrigation of the millet reduced the salt in the soil the "seepage" to adjoining bays aggravated the trouble there and militated against the establishment of pasture mixtures sown in the autumn of 1941.

Last spring, millet was again sown, this time without any preliminary disturbance of the cover of weeds, barley grass, &c., and this treatment is expected to favour the establishment of pasture from autumn sowing in 1942.

Koroop—(Mr. D. J. Smith)

The Koroop plot is situated on box land (Tragowell clay) in the bend of the Pyramid Creek, and was so badly salted that it was intended to make watering trials the main objective.

Oats and barley were sown in the autumn of 1940, but owing to the dry season the seed was "pickled" by the salt before irrigation was begun in August. To date, the trials show that best results have been obtained where frequent regular watering and ponding have been practised.

An interesting feature of this trial is that regular and frequent readings carried on for more than two years from over thirty bores did not give any evidence of seepage from the creek, and yet "seepage" has occurred from the channel put in to serve the experimental area.

Although the bed of a main drain that skirts the plot is 3 feet lower than the water table and less than half a chain distant there has been no marked lowering of the ground water level on the plot, indicating that surface drains are limited in their effects.

As yet, the ground is too salty to permit the establishment of plants less tolerant to salt than Wimmera rye grass, and present efforts are directed toward establishing and maintaining a cover of weeds and volunteer species of grasses as a preliminary to the sowing of the rye grass.

McMillans—(Mr. T. E. E. Bond)

In the McMillans locality the water table is very high and the plot is badly affected with salt. The physical conditions of the soil are so unsatisfactory that not more than 1 inch of water is absorbed at a watering, whereas normal soil of this type is expected to take 3 to 4 inches.

It was necessary to grade in 1940 and again in 1941, in order to put the area into a satisfactory condition for irrigation and a good cover of "sea blite" and similar weeds has now been established. In addition there are some patches of Wimmera rye grass and several of a local strain of strawberry clover.

Surface sowing of Wimmera rye grass without disturbing the present cover and top dressing with superphosphate is the programme contemplated this year.

Tragowel—(Late Mr. J. K. McIntosh)

The soil at Tragowel is described as "grey plain," and although suffering badly from an excess of alkali has a lower water table (48 to 60 inches) than the other plot sites.

Owing to the heavy infestation of rabbits, it was necessary to wire-net the experimental area, but no difficulty has been experienced in spite of adverse seasons in establishing lucerne and such species as perennial and Wimmera rye grass, *Paspalum dilatatum*, Rhodes grass-cocksfoot, *Phalaris tuberosa*, kikuyu, white, strawberry, alsike, red, and subterranean clovers on an area comprising five acres.

The remaining five acres are to be regraded and sown with perennial pastures in autumn 1942.

Although reclamation on this plot has been carried out satisfactorily it would be incorrect to assume that all grey plain land in this vicinity can be improved so easily as the ground water conditions are worse in some areas.

MANAGEMENT OF SALT AFFECTED LAND

Mr. A. Morgan, B.Agr.Sc., Irrigation Field Officer at Kerang, reports:

Preliminary findings on the Koroop and McMillans blocks indicate that "ponding" of irrigation water to wash the salt down is the quickest and most effective way of reducing the concentration of alkali in the soil, but once the stage is reached that some pasture herbage can be grown, the border-check system should be used, as ponding is inconvenient and wasteful and increases the injurious effects of seepage.

Permanent pasture successfully established on Kerang land.

A compromise to ponding is to modify the border system by setting out the irrigation bays in the ordinary manner and placing temporary checks across them to hold up the water. These can be removed later when conditions improve.

Normal methods of working fallows before sowing are undesirable on salty land as it is best to retain as much vegetative cover as possible to shade the ground and draw off excess soil moisture. Any seed sown should be put in with as little disturbance as possible and covered lightly. Of the various pasture species tried, Wimmera rye grass and subterranean clover have been outstanding as reclaiming agents.

Mr. Morgan considers that the top-dressing of badly affected land is not of much value unless there is a plant population present, capable of responding, but once watering has encouraged the growth of some of the annual legumes, then light dressings of "super." can be justified.

TABLE 14.—MANURIAL TRIAL AT SWAN HILL—(A. DOUGLAS)

Total Annual Yields of Greenstuff in cwt. per Acre

Manurial Treatment per Acre per Annum.	29.6.38 to 21.6.39.	21.6.39 to 26.6.40.	26.6.40 to 8.7.41.	8.7.41 to 10.12.41.
No Manure	294·5	246·5	277·5	211·0
Super. 1 cwt.	291·0	282·0	331·0	252·2
Super. 2 cwt.	319·0	312·5	355·0	272·0
Super. 3 cwt.	390·0	379·0	392·0	301·8
Super. 4 cwt.	395·0	401·5	386·5	311·8
Super. 6 cwt.	395·0	405·5	437·5	340·2
Super. 2 cwt. + Amm. Sulph. 1 cwt.	331·0	297·0	350·5	278·4
Super. 2 cwt. + Pot. Sulph. 1 cwt.	321·5	349·0	356·0	282·1
Super. 2 cwt. + Amm. Sulph. 1 cwt. + Pot. Sulph. 1 cwt.	313·0	320·0	362·5	277·5
Super. 2 cwt. + Lime 10 cwt.	390·5	394·0	390·0	284·0
Super. 2 cwt. + Gypsum 10 cwt.	323·5	324·0	374·5	283·0
Super. 2 cwt. + Amm. Sulph. 1 cwt. + Lime 10 cwt.	346·0	337·0	393·0	279·0

TABLE 15.—MANURIAL TRIAL AT COHUNA—(G. MAJOR)

Total Annual Yields of Greenstuff in cwt. per Acre

Manurial Treatment per Acre per Annum.	28.6.38 to 22.6.39.	22.6.39 to 27.6.40.	27.6.40 to 7.7.41.	7.7.41 to 11.12.41.
No Manure	408·0	366·0	414·0	196·6
Super. 1 cwt.	423·0	386·0	453·5	216·0
Super. 2 cwt.	456·5	442·0	470·0	276·9
Super. 4 cwt.	542·0	508·0	499·0	322·0
Super. 4 cwt. (2 applications)	488·5	433·5	517·5	318·5
Super. 2 cwt. + Pot. Sulph. 1 cwt.	445·5	422·5	444·5	246·0
Super. 2 cwt. + *Lime 1 ton every 5 years	460·0	411·0	511·5	282·1
Super. 2 cwt. + *Gypsum 1 ton every 5 years	463·0	422·0	477·5	280·2
Bone Fertilizer 2 cwt.	417·0	438·0	459·0	253·8

TABLE 16.—MANURIAL TRIAL AT TONGALA—(J. BULLINGHAM)

Total Annual Yields of Greenstuff in cwt. per Acre

Manurial Treatment per Acre per Annum.	22.6.38 to 20.6.39.	20.6.39 to 24.6.40.	24.6.40 to 9.7.41.	9.7.41 to 9.12.41.
No Manure	327·5	242·0	288·5	104·2
Super. 1 cwt.	334·0	276·0	338·5	151·4
Super. 2 cwt.	352·5	320·5	346·5	188·8
Super. 4 cwt.	415·0	393·0	390·5	213·6
Super. 4 cwt. (2 applications)	436·0	380·0	366·5	209·4
Super. 2 cwt. + Pot. Sulph. 1 cwt.	363·0	340·0	353·5	200·9
Super. 2 cwt. + *Lime 1 ton every 5 years	405·0	340·5	392·5	197·5
Super. 2 cwt. + *Gypsum 1 ton every 5 years	357·5	320·5	401·5	188·0
Bone Fertilizer 2 cwt.	367·0	311·0	335·5	189·1

* Lime and Gypsum applied in 1926, 1929, and 1934.

TABLE 17.—MANURIAL TRIAL AT STANHOPE—(E. HADFIELD)

Total Annual Yields of Greenstuff in cwt. per Acre

Manurial Treatment per Acre per Annum.	20.6.38 to 19.6.39.	19.6.39 to 24.6.40.	24.6.40 to 9.7.41.	9.7.41 to 8.12.41.
No Manure	298·5	309·0	274·5	175·1
Super. 1 cwt.	301·0	340·0	263·5	205·0
Super. 2 cwt.	280·0	342·0	328·5	233·7
Super. 3 cwt.	356·0	428·5	329·0	264·0
Super. 4 cwt.	340·5	419·0	310·0	284·9
Super. 6 cwt.	350·0	442·0	331·0	290·5
Super. 2 cwt. + Amm. Sulph. 1 cwt.	341·5	372·5	322·0	215·8
Super. 2 cwt. + Pot. Sulph. 1 cwt.	307·5	370·0	296·5	266·0
Super. 2 cwt. + Amm. Sulph 1 cwt. + Pot. Sulph 1 cwt.	320·5	360·0	327·0	244·3
Super. 2 cwt. + Lime 10 cwt.	283·0	351·0	291·0	242·0
Super. 2 cwt. + Gypsum 10 cwt.	315·0	383·0	308·0	235·8
Super. 2 cwt. + Amm. Sulph. 1 cwt. + Lime 10 cwt.	274·0	338·5	301·5	204·5

TABLE 18.—MANURIAL TRIAL AT COBDEN NORTH —(J. ROBERTS)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. K1.	P2. Ca20.	P2. K1. Ca20.	P2. N1. K1.	K1.	Total Production.
Spring—								
1935 ..	91	128	164	118	155	127	96	879
Year—								
1936 ..	104	200	266	201	275	258	115	1,419
1937 ..	78	106	186	123	201	172	102	968
1938 ..	45	68	132	81	142	132	51	651
1939 ..	81	123	271	123	275	234	86	1,193
1940 ..	33	38	85	46	95	95	41	433
1941 ..	62	89	241	93	249	231	83	1,018
7 years' total ..	494	752	1,345	785	1,392	1,249	574	6,591

TABLE 19.—MANURIAL TRIAL AT COBDEN EAST —(G. A. MILLARD, FORMERLY VAGG)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. K1.	P2. Ca20.	P2. K1. Ca20.	P2. N1. K1.	K1.	Total Production.
Spring—								
1935 ..	174	215	239	216	236	214	173	1,467
Year—								
1936 ..	157	257	300	258	284	282	146	1,684
1937 ..	133	205	270	211	260	246	119	1,444
1938 ..	61	148	197	155	200	190	68	1,019
1939 ..	87	198	317	193	310	289	93	1,487
1940 ..	22	75	172	73	162	167	25	696
1941 ..	35	108	218	108	224	230	78	996
7 years' total ..	669	1,206	1,713	1,214	1,676	1,618	697	8,793

TABLE 20.—MANURIAL TRIAL AT COBDEN WEST —(J. ERREY)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. K1.	P2. Ca20.	P2. K1. Ca20.	P2. N1. K1.	K1.	Total Production.
Spring—								
1935 ..	64	75	95	66	101	110	86	597
Year—								
1936 ..	97	120	219	113	253	226	144	1,172
1937 ..	84	98	158	96	184	175	127	922
1938 ..	46	59	101	51	127	124	65	573
1939 ..	96	101	215	96	245	215	150	1,118
1940 ..	37	35	127	35	141	146	67	588
1941 ..	57	67	162	62	190	187	85	810
7 years' total ..	481	555	1,067	519	1,241	1,183	724	5,780

TABLE 21.—MANURIAL TRIAL AT COBDEN WEST —(No. 3)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. K1.	P2. Ca20.	P2. K1. Ca20.	P2. N1. K1.	K1.	Total Production.
Spring—								
1935 ..	104	125	167	115	156	147	142	956
Year—								
1936 ..	136	153	266	150	258	239	178	1,380
1937 ..	103	106	200	107	204	200	142	1,062
1938 ..	57	69	123	69	142	132	75	667
*1939 ..	13	25	107	22	129	115	31	442
5 years' total ..	413	478	863	463	889	833	568	4,507

* Incomplete.

Table 22.—Manurial Trial at Colac West —(J. McRae)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. K1.	P2. Ca20.	P2. K1. Ca20.	P2. N1. K1.	K1.	Total Production.
Spring—								
1935 ..	82	163	187	158	180	174	90	1,034
Year—								
1936 ..	125	293	359	298	341	317	139	1,872
1937 ..	74	133	167	140	169	158	78	919
1938 ..	32	69	96	74	117	97	36	521
1939 ..	117	203	308	224	370	277	132	1,631
1940 ..	33	60	93	62	115	90	36	489
1941 ..	92	137	201	134	240	201	96	1,101
7 years' total ..	555	1,058	1,411	1,090	1,532	1,314	607	7,567

Table 23.—Manurial Trial at Larpent— (N. Watchorn)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. K1.	P2. Ca20.	P2. K1. Ca20.	P2. N1. K1.	K1.	Total Production.
Spring—								
1935 ..	107	111	117	111	117	116	106	785
Year—								
1936 ..	173	244	301	235	278	270	188	1,689
1937 ..	130	175	233	172	257	219	150	1,336
1938 ..	34	64	128	60	140	123	40	589
1939 ..	165	242	365	221	367	361	191	1,912
1940 ..	50	64	146	64	139	144	59	666
1941 ..	114	105	270	96	277	282	136	1,280
7 years' total ..	773	1,005	1,560	959	1,575	1,515	870	8,257

Table 24.—Manurial Trial at Lardner —(Teese)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	* P2. N1.	P2. N1. Ca20.	P2. Ca20.	* N1. Ca20.	Ca20.	Total Production.
1936 ..	235	233	232	221	226	218	208	1,573
1937 ..	121	102	120	122	113	115	102	795
1938 ..	27	24	37	43	34	40	28	233
1939 ..	105	112	119	122	119	123	103	803
1940 ..	50	57 {	P2 K1 }	63	73 {	P2 Ca20 K1 }	52	..
1941 ..	91	118	247	101	118	251	89	..
6 years' total ..	629	646	..	672	683	..	582	..

Table 25.—Manurial Trial at Mirboo North—(L. J. Austin)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	* P2. N1.	P2. N1. Ca20.	P2. Ca20.	* N1. Ca20.	Ca20.	Total Production.
1936 ..	105	156	148	206	201	140	156	1,112
1937 ..	55	86	82	122	115	78	78	616
1938 ..	19	43	43	63	55	31	31	285
1939 ..	76	140	123	161	163	93	91	847
1940 ..	33	84 {	P2 K1 }	101	105 {	P2 Ca20 K1 }	45	..
1941 ..	42	99	89	102	110	94	42	..
6 years' total ..	330	608	..	755	749	..	443	..

Table 26.—Manurial Trial at Limonite— (G. W. Bickerton)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	* P2. N1.	P2. N1. Ca20.	P2. Ca20.	* N1. Ca20.	Ca20.	Total Production.
1936 ..	189	229	238	322	332	221	218	1,749
1937 ..	157	193	185	272	287	169	153	1,416
1938 ..	42	63	64	96	97	46	50	458
1939 ..	93	150	128	204	229	110	106	1,020
1940 ..	48	78 {	P2 K1 }	91	94 {	P2 Ca20 K1 }	43	..
1941 ..	73	187	151	188	202	197	65	..
6 years' total ..	602	900	..	1,173	1,241	..	635	..

Table 27.—Manurial Trial at Warragul —(C. Tyssen), No. 2

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	* P2. N1.	P2. N1. Ca20.	P2. Ca20.	* N1. Ca20.	Ca20.	Total Production.
1936 ..	127	200	209	238	225	134	127	1,260
1937 ..	75	163	142	163	175	72	78	868
1938 ..	24	85	83	90	90	26	17	415
1939 ..	56	124	115	121	132	67	57	672
1940 ..	52	100 {	P2 K1 }	103	105 {	P2 Ca20 K1 }	49	..
1941 ..	57	101	186	97	101	231	64	..
6 years' total ..	391	773	..	812	828	..	392	..

* After August, 1940, P2 + N1 plots changed to P2 + K1.
N1 + Ca20 plots changed to P2 + Ca20 + K1.

TABLE 28.—MANURIAL TRIAL AT MIRBOO NORTH—(J. BARRAND)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	87	104	119	130	124	109	673
1933	65	80	92	116	97	87	537
1934	89	94	105	136	91	105	620
1935	57	61	67	99	74	67	425
1936	15	22	21	32	26	29	145
5 years' total	313	361	404	513	412	397	2,400

TABLE 29.—MANURIAL TRIAL AT TOORA

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	209	248	257	262	268	264	1,508
1933	159	215	211	219	233	225	1,262
1934	219	324	306	328	329	342	1,848
1935	199	279	276	274	299	286	1,613
to 13.10.36	63	94	81	80	85	107	510
5 years' total	849	1,160	1,131	1,163	1,214	1,224	6,741

TABLE 30.—MANURIAL TRIAL AT WARRAGUL—(C. TYSSEN), No. 1

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3	Total Production.
1932	81	89	97	126	102	96	591
1933	49	55	71	89	77	58	399
1934	87	111	105	126	113	125	667
1935	59	108	76	115	90	113	561
1936	87	151	116	134	160	159	807
1937	40	51	47	60	67	68	333
1938	10	18	25	39	36	25	153
1939	61	131	96	126	141	148	703
1940	36	54	53	61	85	44	333
1941	49	76	67	81	168	96	537
10 years' total	559	844	753	957	1,039	932	5,084

TABLE 31.—MANURIAL TRIAL AT CALDERMEADE—(J. DAVIS)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	196	297	293	287	290	310	1,673
1933	124	238	233	256	249	261	1,361
1934	194	360	321	341	345	395	1,956
1935	285	503	494	477	526	502	2,787
1936	238	465	433	445	472	475	2,528
1937	203	301	304	310	326	318	1,762
1938	41	118	126	141	140	125	691
1939	298	384	369	378	383	369	2,181
1940	76	124	128	137	151	128	744
1941	135	340	300	307	344	319	1,745
10 years' total	1,790	3,130	3,001	3,079	3,226	3,202	17,428

TABLE 32.—MANURIAL TRIAL AT KORUMBURRA—(F. E. KURRLE)

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P3.	Total Production.
1932	158	190	197	224	207	209	1,185
1933	68	135	129	165	145	155	797
1934	149	252	211	261	241	265	1,379
1935	118	202	173	207	201	211	1,112
1936	148	246	228	251	254	270	1,397
1937	112	224	212	228	249	247	1,272
1938	43	114	105	119	130	128	639
1939	150	242	225	236	244	251	1,348
1940	94	201	175	210	197	224	1,101
1941	87	243	200	246	226	234	1,236
10 years' total	1,127	2,049	1,855	2,147	2,094	2 194	11,466

TABLE 33.—MANURIAL TRIAL AT YARRAGON

Total Annual Yields of Greenstuff in cwt. per Acre

Season.	Nil.	P2.	P2. N1.	P2. N1. Ca20.	P2. N1. K1.	P.3	Total Production.
1932	145	197	194	200	200	196	1,132
1933	120	200	196	219	209	216	1,160
1934	117	219	203	239	211	222	1,211
3 years' total	382	616	593	658	620	634	3,503

VEGETABLE DRYING

By RACHEL M. PEILE, Fruit Preserving Expert

WHERE there is difficulty in obtaining preserving jars or rubber rings, drying will be found a simple and useful way of preserving vegetables. No special equipment is needed. Dried vegetables will occupy only about one-fifth the space required by fresh vegetables, and can be stored in paper-lined tins or boxes, or in bottles with screw-top lids. While not as valuable as fresh, they provide a useful substitute. In most cases it is very difficult to distinguish between fresh and dried vegetables in flavour. Carrots, parsnips, turnips, beans, peas, pumpkins, cabbage, beet, potatoes, silver beet, rhubarb, and mushrooms may be dried with success. Tomato pulp and onions can be dried, but not as successfully.

In warm climates the drying can be done out of doors. In cooler climates the indoor methods of dehydration are best, as vegetables need to be dried quickly. For outdoor drying wooden trays or racks may be used. For indoor drying vegetables may be placed on cloths in oven trays and set in cool ovens with the door open; or they may be placed on a plate warmer, or on a rack of trays over the stove; or placed in a home-made evaporator.

For drying, most vegetables should be young and tender, but peas should be fully mature. The vegetables are washed and prepared as for cooking. When prepared the vegetables are blanched, that is dipped in boiling water or steamed for three to five minutes, according to age, size, and variety. Steaming is preferable to dipping, as less food value is lost by this method. When dipping green vegetables bi-carbonate of soda (one teaspoonful to a gallon of water) may be added to improve the colour. To facilitate handling, vegetables may be given a cold dip after blanching. The surface moisture is then wiped off with a cloth, and the vegetables are spread to dry. If vegetables are thinly sliced or shredded they will dry more rapidly, have a better colour and, when soaked, absorb moisture more rapidly than if cut coarsely. Carrots, parsnips, or turnips can be shredded and later used for soups without soaking.

The temperature for drying should be about 110 deg. F. at the commencement—the temperature of a very hot day—and should rise to about 160 deg. F., a temperature too low for oven cookery. A current of hot air is required, therefore the oven door should be left open. The vegetables should be stirred to prevent scorching. Root vegetables become hard when dry; other vegetables should be broken, and the cut edge squeezed to be sure that no moisture is present. Sun drying may take several days; oven drying two to six or eight hours, depending on the air current and the size of the pieces. *Rapid drying gives a better colour and flavour than slow drying.*

If dried out of doors vegetables may be heated in the oven to destroy any insects' eggs present. This heating to a temperature of 160 to 180 deg. F. kills life, so that peas and beans dried in this way would be useless for sowing. Green vegetables, such as French beans, are bleached by drying in strong sunlight.

After removing the vegetables from the drier they should be left over night in a heap and examined the next day for moisture. If moisture cannot be squeezed out they may be stored in containers such as tins or jars with fitting lids. Dried vegetables should be stored away from any likelihood of attack by rodents, insects, or mould.

French or Butter Beans. — Wash, string, shred, blanch, and dry. These give a very good result.

Dry-shelled Beans.—Mature and dry on the bush. Shell and store. After shelling they may be washed and heated in the oven, 160 to 180 deg. F. for fifteen minutes to kill any insects and prevent losses. Navy beans are an example.

Peas.—Mature green peas may be shelled, blanched, and dried. Sun drying is not generally satisfactory. Field peas may be treated as for dry-shelled beans, being allowed to dry on the bush.

Carrots, Parsnips, and Turnips. — Wash, scrape or peel, blanch. If required for soup shred—otherwise cut in thin rings.

Cabbage, Silver Beet, and Spinach.—Wash, cut out hard stems, slice, blanch, and dry.

Pumpkin.—Slice and steam until transparent; then dry.

Potato.—Peel, slice, steam until transparent; then dry.

Beetroot.—Dip in hot water, peel, slice, and dry.

Onion.—Peel, slice, steam, blanch, dry. (Blanching is not essential.) Dries slowly.

Celery.—Outer stalks and green leaves are suitable. Wash, blanch, dry.

Mushrooms.—Use larger mushrooms. Brush off soil, peel; do not blanch, dry.

Dried Tomato Pulp.—Boil tomatoes as pulp until thick. Spread in layers to dry.

Rhubarb.—Wash, blanch one minute, cut in short lengths, dry.

Corn.—Pick when at its prime, blanch eight minutes, dry.

Dried vegetables should be soaked or refreshed before using. If warm water is used the period of soaking is shorter. Spinach and French beans require about half an hour; other vegetables longer. Beet may be soaked overnight. The soaking water should be used for cooking the vegetables in.

For first experiments a small quantity should be used; later larger amounts can be handled successfully.

Certified Pullorum-free Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Date of Certification.	Number of Birds.
Reformatory Prison, Castlemaine ..	6.3.42	200
"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26.3.42	927
Stewart, J. A., Castlemaine	22.4.42	592
Rushton's Electric Hatcheries, (J. Rushton), Shepparton	28.4.42	653
Christie, R. R., and Son, Bentleigh ..	1.5.42	719
Becker, F. W., Cheltenham	1.5.42	315
Kostos, D., cr. Collins and Waverley roads	11.5.42	801
Evans, R., 50 Simpson-street, Kyneton ..	11.5.42	35
Throup, R. E., Neerim South	11.5.42	200
Berry, R., Campbell's Creek	11.5.42	87
Flack, Mrs. Florence, Horsham ..	11.5.42	100
Need, H. G., Warragul	15.5.42	254
Smith, R. Harcourt	15.5.42	97
Dookie Agricultural College, Dookie ..	19.5.42	447
Pettigrove, D. N., Kennington, via Bendigo	19.5.42	558
Wohlers, S., Jung	21.5.42	139
Throup, N. C., Neerim South	21.5.42	67
Mair, W. P., Tyabb	21.5.42	38
Horsfall, J. B., Lower Templestowe ..	26.5.42	720
Smith, F., Terang	1.6.42	947
San Miguel, Mrs. M. H., Box Hill ..	1.6.42	1,503
Rae, J., Sebastopol	1.6.42	1,497
Bartlett, O. E., Pimpinio	1.6.42	228
Cakebread, H., Shady Creek, via Buln Buln	3.6.42	112
Simpson, G. D., Tally Ho	3.6.42	680
Clark, H. N. Croydon	8.6.42	1,631
Abernethy, F. J., Horsham	8.6.42	368
Heath, A. L., Spring Vale	8.6.42	130
Lowe, L. S., Bayswater	8.6.42	241
Youl, R. S., Wedderburn	8.6.42	757
Hewett, A., Bayswater	8.6.42	247
Thomas, Mrs. J., Outtrim	8.6.42	100
Barnes, J. H., Blackburn	8.6.42	978
Wimhurst, C. J., Tongala	8.6.42	417
Williams, V. (Wangaratta Hatchery), 91 Tone-road, Wangaratta	12.6.42	568
Kosch, E. W., Minyip	12.6.42	343
Mumford, L. J., Healesville	12.6.42	252
Broadbent, C. A., Yarraberb, via Derby	12.6.42	193
Massie, G., Shepparton	12.6.42	1,309
Shipp, R., Kerang	12.6.42	375
Hopkins, C. A., Shepparton	12.6.42	1,348
Hunt, R. R., Burwood	19.6.42	300
Henderson, C. W., Shepparton East ..	22.6.42	247
Mitchell, B., Kangaroo Flat	22.6.42	703
Gwyther, R. P., Highton, via Geelong ..	22.6.42	206
Hayes, R., Montrose	26.6.42	188
Sloan, G. J., Bayswater	26.6.42	191
Everard, H. L., Hawkesdale	30.6.42	321
Ridgway, G., Noble Park	30.6.42	76
Stephenson, Mrs. K., Research ..	2.7.42	93
Jones, M. A., Ringwood	2.7.42	283
Major, W. R., Girgarre	2.7.42	88
Walters, Mrs. V., Lower Templestowe ..	2.7.42	44
Grenville Stud Poultry Farm, Springvale South	2.7.42	1,640
Coupar, J. E., Nathalia	2.7.42	487
Clegg, R. M., Hamilton	7.7.42	14
Mackintosh, Walter C., Neerim South ..	8.7.42	194
Hurst, H., Eltham	9.7.42	913
Jackson, C. and H., Carrum Downs ..	9.7.42	94
Webb, A. E. H., Cranbourne	13.7.42	1,541
Scouller, R. C., Cobden	13.7.42	100
Gibbs, A. E., Stanhope	15.7.42	623
Abikhair and Tacey, Heidelberg ..	15.7.42	538
All Red Poultry Farm (E. M. Nichols), Yan Yean	15.7.42	460
Peck, D., Tally Ho	15.7.42	275

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69	Longerenong Agricultural College	Dooen	43
Banyule Stud Pty. Ltd.	Wangaratta ..	42	McNabb and Son, G. A.	Irrewillipe East ..	177
Black, I. S., Estate ..	Mount Noorat ..	52	Onley, W. H. ..	"Glenholme," Caldermeade	50
Clarke, A. B. ..	Glenormiston South	16	Payne, A. E. T. ..	"Yarra View," Lilydale	63
Dennis, Mrs. A. A. ..	Frankston.. ..	33	Payne, T. E. N. ..	"Woodburn," Kilmore	46
Dookie Agricultural College	Dookie	77	Powell, T. S. ..	"Carellen," Mansfield	46
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	15	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Geelong Grammar School	Corio	56	Samuel, Misses G. and E.	Lang Lang ..	48
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29	School of Horticulture	Burnley	9
Gorman, A. W. ..	"Cathcart," Alexandra	61	State Experiment Farm	Rutherglen ..	40
Holloway, R. W. ..	Caldermeade ..	70	State Research Farm	Werribee	229
Kilmany Park Farm Home for Boys	Sale	94	Wells, W. G. ..	Caldermeade ..	65
Lawrence, P. H. ..	"Rainga," Tarrawarra	72			

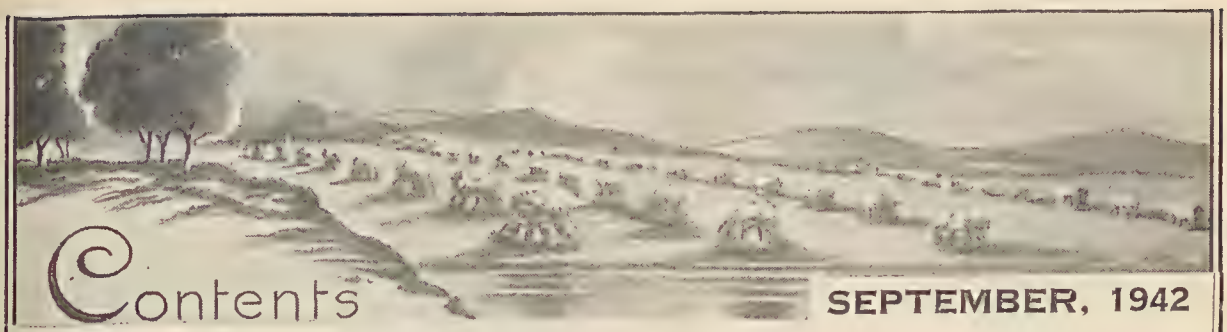
In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43	Carr, W. J. ..	Wollert	65
Andrew, J. C. ..	Whittlesea ..	121	Child, G. P. ..	Epping	53
Andrew, W. ..	Whittlesea ..	160	Christian Bros. ..	Doreen	41
Andrews, E. H. ..	Templestowe ..	19	Clark, P. W. ..	Whittlesea ..	62
Balharrie, J. A. ..	Whittlesea North ..	59	Clements, M. and L., and Son	Bundoora	135
Barclay, A. H. ..	Whittlesea ..	107	Cobain, J.	Thomastown ..	40
Barling, J. ..	Mernda	39	Collins, L.	Doreen	74
Batten, R. J. ..	Wollert	44	Cornfoot, D. H. ..	Whittlesea ..	25
Bebbington, J. ..	Whittlesea ..	92	Cotchin, J. ..	Woodstock ..	18
Benson, R. ..	South Morang ..	28	Coulthard, J. J. ..	Whittlesea ..	66
Bodycoat, A. ..	Wollert	39	Cox, E. H. ..	Lower Templestowe	37
Booth, Mrs. A. ..	Warrandyte ..	8	Craker, Mrs. E. ..	Warrandyte ..	2
Bourke, G. J. ..	Fairfield	82	Cumming, H. R. ..	South Morang ..	20
Bradbury, A. K. ..	Diamond Creek ..	31	Danaher, J. V. ..	Whittlesea ..	63
Buckley, F. J. ..	Mernda	104	Danns, N. C. ..	Whittlesea ..	34
Bunting, J. ..	Epping	35	Dennett, C. A. ..	Cragieburn ..	38
Butler, W. ..	Wallan	49	Deutscher, H. W. ..	Mernda	168
Callaghan, L. ..	Epping	34	Deveny, M. ..	Bundoora	51
Callaghan, T. F. ..	Thomastown ..	40			

TUBERCLE-FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name	Address.	Number in Herd at Last Test.
Drysdale, J. C.	Warrandyte	37	Nalder, H. S.	Epping	20
Evans, Miss M.	Bundoora	29	Nebel, Mrs. A. E.	Thomastown	38
Fellows Bros.	West Heidelberg	52	Norton, O. G.	Bundoora	37
Fergusson, M. A.	Whittlesea	92	O'Hern, T.	Epping	58
Fitzsimons, B.	Lower Templestowe	30	O'Loughlin, W. L.	Epping	27
Fox, A.	Mernda	59	Parker, Mrs. A. E.	Greensborough	24
French, T. W.	Wollert	43	Pentland, C. V.	Templestowe	17
Gallus, E. A.	Doncaster	11	Pettit, W. H.	Thomastown	36
Gardiner, C. E.	Epping	20	Pitson, R H.	Yarrambat	17
Gibbs, C.	Arthur's Creek	28	Player, A. D.	Epping	42
Graff, Mrs. M. G.	Mernda	24	Power, L. J.	Mernda	52
Graham Bros.	Whittlesea	71	Quinlan Bros.	Epping	49
Green, W.	Mernda	11	Raper, L. R.	Greensborough	36
Hall, J. E., Mrs.	Whittlesea North	13	Rawlings, J. H.	Whittlesea North	41
Hancorne, Miss M. R.	Yan Yean	27	Righetti, L. A.	Lower Templestowe	40
Harding, J. E.	Templestowe	42	Robson, Mrs. G. A.	South Morang	47
Hargreave, Mrs. E. J.	Whittlesea	21	Rodgers, E.	Whittlesea North	11
Harkness, H. J.	South Morang	31	Rosewarne, Miss P.	Yan Yean	43
Harmer, R. E.	Wollert	38	Ross, A.	Templestowe	5
Hawkes, Miss D.	Warrandyte	19	Salcki, S.	Thomastown	51
Hehr, H.	Epping	32	Seeber, B.	Thomastown	24
Hehr, R.	Wollert	23	Shanks, John	Mernda	73
Herd, J.	Epping	46	Sheeky, A. A.	Templestowe	14
Hewitt, C. J.	Wattle Glen	8	Short, E.	East Preston	99
Higgs, R. N.	Yan Yean	76	Siebel, F.	Thomastown	26
Hobbs, Mrs. F. J.	Doncaster East	6	Simpson, W. G.	Donnybrook	12
Hobbs Bros.	Heidelberg	65	Skals, P.	Rosanna	28
Howden, A.	Epping	29	Smirfitt, J. E.	Epping	39
Howell, G. G.	Wollert	221	Smith, G. A.	Templestowe	63
Hughes, J.	South Morang	1	Smith, J. R.	Mernda	34
Jackson, Mrs. M. A.	Heidelberg	7	Smith, L. McA.	Yan Yean	2
Jenkins, T. H.	Whittlesea	24	Smith, L. W.	Bundoora	73
Johnstone, J. A., Miss	Mernda	14	Smith, P. A.	Ivanhoe	2
Jones, A. J.	South Morang	30	Smith, R. A.	Epping	27
Jukes, C.	Epping	39	Smith, R. J.	Epping	54
Jukes, W. H.	South Morang	35	Smith, S. E.	Epping	31
Junor, G. M.	South Morang	37	Southon, H. W.	South Morang	27
Kell, W. E.	Greensborough	21	Stephens, H.	Epping	48
Lay, P.	Alphington	30	Stimson, T.	Woodstock	33
Loft, A. H.	Wollert	52	Tarry, J.	South Morang	24
McCormack, D.	Woodstock	33	Thomas, W. C.	Yan Yean	31
McDonald, A. J.	Whittlesea	2	Towt, C. W.	Glenvale	136
McDonald, J.	Templestowe	20	Trethowan, F. W.	Donnybrook	94
McDowell, R. H.	Greensborough	28	Vallence, C. A.	Epping	11
McGregor, W. B.	Mernda	41	Van, E. L.	Templestowe	28
McKay, J. M.	Coburg	62	Walsh, J. B.	Templestowe	11
McKay, L.	Kal Kallo	12	Whelpton, B.	Whittlesea North	59
McKendry, J.	Doreen	47	White, W.	Greensborough	18
McKernan, A. H.	Whittlesea	24	Whittingham, E. W.	Greensborough	40
McKie, J. W.	Wollert	83	Williams, E. A.	Thomastown	33
McLean, J. F.	Bundoora	32	Williamson, J.	Doncaster (High-street)	5
McPhee, K.	Whittlesea	116	Wilson, J. E.	Diamond Creek	35
McPherson, A.	Yan Yean	64	Wilson, Mrs. M.	South Morang	14
Mann, W. J. and K. W.	Thomastown	108	Wood, A. V.	Yan Yean	125
Mason, N.	Donnybrook	52	Wrest, W.	Epping	76
May, Mrs. M.	Warrandyte	5	Wuchatsch, A.	Epping	29
Mays, Mrs. A. M.	Doncaster	5	Wuchatsch, J. D.	Epping	14
Merriman, J.	Diamond Creek	17	Yann, R.	Wollert	52
Miller, A. J.	Whittlesea North	47	Young, Mrs. A.	Wollert	33
Miller Bros.	Greensborough	36	Ziebell, H.	Thomastown	32
Mosig, H. C.	Epping	24			

There are also 88 herds in which 3,832 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.



Contents

SEPTEMBER, 1942

		PAGE
Standard Herd Test—Report for year 1941–42	*W. J. Yuill*	441
Increase in Sugar Beet Acreage Required—Higher Price Offered		452
Live Stock Notes	Compiled by *A. C. T. Hewitt, M.Agr.Sc.*	453
Advanced Register of Merit—Standard for Pure-bred Cows	*W. J. Yuill*	457
Poultry Feeding Tests, 1941–42 Results	*W. O. Pederick and A. G. Clark*	460
The Jerusalem Artichoke	*K. Harrison*	463
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	465
Garden Notes	*J. L. Provan, B.Agr.Sc.*	466
Growing Field Beans in Victoria	*C. E. Cole, B.Agr.Sc., G. N. Hyam, and F. M. Read, M.Agr.Sc.*	468
Tubercle-free Herds (Dairy Cattle)		482
List of Cows Qualified for Advanced Register of Merit		484
Pullorum-free Flocks (Poultry)		496

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

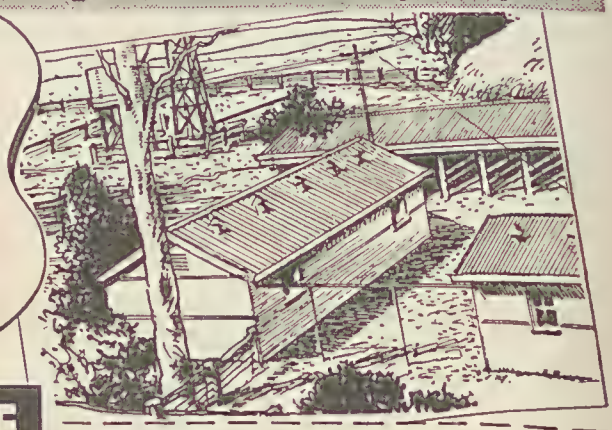
POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions 2½d.; to U.S.A. and Foreign Countries, 3½d.

For Permanent Farm Roofing

Be sure of a roof that is *economical* and *permanent* by specifying Fibrolite Asbestos Cement corrugated Roofing. Fibrolite ensures insulation against extreme heat or cold, and does not need painting. Write for illustrated fixing leaflet.

JAMES HARDIE & COY. PTY. LIMITED
CNR. CITY RD. & CLARENDON ST., SOUTH MELBOURNE
PHONE MX 4711



HARDIE'S GENUINE
FIBROLITE
ASBESTOS CEMENT CORRUGATED ROOFING

Send roofing literature to

Name_____

Address _____

INDEX TO ADVERTISEMENTS

FRONT SECTION

General Motors-Holden's Pty. Ltd. v
Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) ... ... opp. p. 456
Hardie James & Co. Pty. Ltd. ii
H. V. McKay Massey Harris Pty. Ltd. ... iii
International Harvester Coy. of Australia Pty. Ltd. iv
Law Somner Pty. Ltd. (Seeds) vi
Leggo, Victor, & Farmers Ltd. ... inside cover
Vacuum Oil Co. Pty. Ltd. .. opp. p. 457

BACK SECTION

Ajax Insurance Company Ltd. .. outside cover
Australian Barley Board (Barley Prices) vii
Australian Cement Ltd. ... ... inside cover

BACK SECTION—*continued*

Blyth Chemicals Ltd. xi
Cameron & Sutherland Pty. Ltd. ix
Cockbill, J. vii
Elder Smith & Co. Ltd. (Esa Bluestone) ... x
Joyce, A. & Co. Pty. Ltd. vii
Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 481
Nightingale, A. G. & Co. (Nursery Stock for sale) x
Rylands Bros. (Aust.) Pty. Ltd. viii
Shell Co. of Australia Ltd. ... opp. p. 480
State Savings Bank x
Trewhella Bros. Pty. Ltd. xii
Trinca Stud Poultry Farm x
Victorian Railways xii
W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) xi

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

STANDARD HERD TEST

REPORT FOR YEAR 1941-42

By W. J. YUILL, Supervisor of Herd Testing

THE Standard Herd Test was inaugurated in 1912, and the first report appeared in this *Journal* for September, 1913. It contained the records of 62 cows that were tested in five herds. The highest producing cow of that year, "Banyule Silvermine 4th," yielded 388 lb. butterfat.

By 1932-33, there were 2,861 cows under test; but from that time onwards the numbers became progressively smaller, until 1939, when only 1,479 were recorded.

The number of tested cows in the year just concluded, however, has again risen to a very high level, being nearly 70 per cent. higher than it was four years ago. Further, more than a score of herds could not be tested because of staff restrictions due to the war.

The fact that 2,200 cows averaged 353 lb. butterfat—only 7 lb. below the 1939 record—indicated a generally good dairying season.

Some remarkably interesting records of herds and individual cows have been made since the inauguration of the Standard Herd Test. Inter-breed rivalry has at times been intense. This competitive spirit tended to impel owners to develop each breed's producing capacity to the uppermost limits; sometimes, it must be

The reserve champion herd of Dr. A. R. Haywood, "Windrest," Hastings. The herd average was 507 lb. butterfat.

"Banyule Tiddlewinks 26th." This junior 4-yr.-old Jersey cow, owned by Banyule Stud Pty. Ltd., produced 935 lb. butterfat.

admitted, at the expense of economic feeding. The influence of high yields on the prices obtained when surplus stocks are sold is looked to by most owners to compensate for any loss incurred by unprofitable feeding.

Some High Records

The first cow to produce over 700 lb. butterfat did not appear in the records until 1920. This was "Rarity 8th of Melrose," her yield being 719 lb. butterfat on twice-a-day milking. In 1924, "Babs of Somerville," on three-times-a-day milking, produced 843 lb. butterfat as a senior four-year-old. This record stood until 1930, when the Friesian cow "Springfield No. 9" yielded 860 lb. butterfat. The only other cows to exceed 800lb. butterfat were the imported Guernsey, "Rose Gem of Maple Lodge," (857 lb.), "Jerseyinn Edith 2nd" (826 lb.), and the Friesian "Westmere Oakwood Duchess" (817 lb.), butterfat. Each of the last-mentioned two cows was milked thrice daily. The 1941 champion test cow "Roads End Sandra" also exceeded 800 lb. butterfat.

Four Cows Exceed 800 lb. Butterfat

Prior to 1942, only six cows had exceeded the high level of 800 lb. butterfat in the 273-day period of the test. During the past year, however, four cows of widely varying classes yielded above this level. They are headed by the Jersey "Banyule Tiddlewinks 26th." Her 935 lb.-butterfat is the highest yield ever recorded by a Standard Herd Test cow of any age or of any breed. She was milked twice daily. Her yield, however, was no doubt increased by the fact that she was not in calf during her record-breaking performance. This prevented her from qualifying for the honour of Champion Herd Test Cow of the year.

From 1936 to 1940-41, only two herds exceeded the level of 500 lb. actual butterfat. Even in 1939, when the record average yield of 360 lb. butterfat for all tested cows was made, there were no herd yields of 500 lb. It is necessary to go back to 1935 to find a group of three herds to exceed this level, the largest being of sixteen cows. In 1932 there were three herds above the 500-lb. level. On that occasion, eleven cows topped the year with 513 lb. butterfat; second place being filled by the "Finchley" herd of ten cows, only 2 lb. lower in the herd averages. This year, again, the 500-lb. level was exceeded by three herds. Twenty "Yarraview" Guernseys, with an average yield of 511 lb. butterfat, and Dr. A. R. Haywood's 26 "Windrest" Jerseys (507 lb. butterfat), each exceeded the previous

T. M. Noble and Son's Junior 3-yr.-old, "Finchley Bluebell's Duchess," produced 802 lb. butterfat.

Top left: "Donside Lydo Lady" (6 yrs. av. 598 lb. butterfat) dam of "Inverurie Blue Bell's" sire. Top right: "Donside Thistledown 2nd," (5 yrs. av. 492 lb. butterfat) dam of "Blue Bell," and Lower: J. H. Goddard's "Inverurie Blue Bell," the 1942 Champion (826 lb. butterfat).

record for a 20-cow herd. Both herds, however, were eclipsed in yield by the "Finchley" herd of 27 cows, whose 533 lb. actual butterfat yield is the highest ever recorded for a herd of that size. A remarkable feature of these yields is their great increase over that of the previous year. In several instances the increase was in the region of 100 lb., while at "Banyule," the difference was 132 lb. per cow.

Because of the remarkable yields of a number of junior cows, several herds have now risen to unusually prominent positions. This has forced down several well-known herds to much lower levels. Even the famous "Mornmoot" herd, with an unbroken run of seven championships, is now in fifth place, despite its very good average of 550 lb. butterfat (with allowances). In all, ten herds exceeded the 500-lb. level when all allowances had been added.

The "Finchley" Herd

The success of the "Finchley" herd can be attributed largely to the extraordinary influence in the breeding plan by "Werribee Lord Burnham," and the skilful management of Mr. Noble, junior, who mainly controls the herd. "Werribee Lord Burnham" is a son of "Werribee Fancy Maderia," the 1933 Standard Herd Test Champion Cow. His influence was as marked with Grade, as with Registered stock; and it was mainly owing to his influence that the previous herd of Grade cows topped the Maffra District Herd Testing Association, just as he is now mainly responsible for the Registered herd topping the Standard Herd Test. An early index of this sire indicated his unusual prepotency for high butterfat percentage character, no fewer than four of his daughters having butterfat percentages exceeding 7 per cent.; while the average of all of his daughters exceeds 6 per cent. One of his daughters, viz., "Finchley Handsome Lady," has the very remarkable 8-years average of 7,326 lb. milk, 7·31 per cent. test, and 538 lb. butterfat. Unlike many high-testing cows, this cow has a good milk flow also. Because of this, she has six yields exceeding 500 lb. butterfat —her best being 652 lb.

"Finchley Masterman," a son of "Werribee Lord Burnham," is an even more valuable sire, for he has raised the average milk yield as well as the butterfat percentage of his daughters over those of high-testing, heavy-milking dams.

Close Breeding Gives Good Results

It is well known that close breeding may mar, as well as make, a herd. It is known also that some of the most famous animals of various breeds have been the result of close breeding, as well as by the safer method of line breeding. Knowing this, the owners of the "Finchley" Stud have not feared the effect of close-breeding the progeny of "Werribee Lord Burnham." A very considerable proportion of the champion herd are either his daughters or the daughters of his son "Finchley Masterman"; or his grandson, "Finchley Vasilika's Masterpiece." The latter is bred similarly to many of the females of the herd, namely, by mating a son and daughter of "Werribee Lord Burnham." The three full sisters, "Finchley Master's Bluebell" (750 lb. butterfat as a junior 4), also the twins "Finchley Bluebell's Duchess" (802 lb.) and "Finchley Bluebell's Princess" (532 lb. as a junior three-year-old), are by "Masterman," a son of "Werribee Lord Burnham," from "Finchley Master's Bluebell," one of his daughters. Other outstanding members of the herd, bred on similar lines, are "Finchley Vasilika" (624 lb. as a junior 4), "Finchley Master's Canary" (604 lb. as a mature cow), and the 438-lb. butterfat junior two-year-old "Finchley Handsome Lady 5th."

Messrs. Noble and Son have concentrated for many years on a proven sire. Because of "Werribee Lord Burnham's" great value they used him as long as he could sire a calf. In his stead, they used one of his selected sons,

A group of daughters of "Finchley Masterman," in the Stud of T. M. Noble and Son, Maffra.

high-producing cows. 1. "Bamawm Fancy Gem" (Estate F. A. Williams), 616 lb. butterfat. 2. P. W. Clark's "Tooronga Aldan's Wyandotte," 648 lb. butterfat as senr. 4-yr.-old. 3. "Edenhope Molly Madeira" (Mr. R. H. Bennett), 665 lb. butterfat. 4. M s. H. A. Prince's "Surrey Bonnie Girl 4th," 707 lb. butterfat. 5. The dairy Shorthorn "Willow Park Duchess 30th" (Mr. W. K. Atkinson), 686 lb. butterfat. 6. The mature Jersey "Rutland Brunette 16th" (S. H. Masters and Son), 618 lb. butterfat. 7. "Bamawm Primrose," mature Jersey (Estate F. A. Williams), 663 lb. butterfat. 8. "Mornmoot Fancy Starbright" (R M. Chirnside), 675 lb. butterfat. 9. Mr. P. J. Maloney's "Belgonia Junette 5th, 713 lb. butterfat as senr. 4-yr.-old.

believing that the use of a son of a proven sire, from a proven selected dam, is the safest method of breeding a good herd. The index of "Finchley Masterman" is given hereunder:—

FIFTEEN PAIR EQUAL PARENT INDEX OF "FINCHLEY MASTERMAN."

	Records Reviewed.	Age Corrected Yields of—		
		Milk.	Average Test.	Butterfat.
9 dams ..	36	8,264	6·08	503
15 daughters ..	32	8,743	6·38	558
Sire's Index ..	..	9,222	6·68	616

From the foregoing table it will be seen that "Finchley Masterman" has raised both the milk yield and test percentage of his daughters. "Finchley Vasilika's Masterpiece," a son of "Finchley Masterman," has also proved to be a great sire. It is mainly through the influence of these three sires that the herd enjoys the distinction of being the highest-testing, heaviest-milking, Jersey herd of the year.

Reserve Champion Herd.

From seventeenth position, in 1940, the "Windrest herd rose to eleventh place in last year's test. It now holds the Reserve Championship for 1942, with the splendid average of 582 lb. butterfat. An even better impression of the herd's achievement is obtained when it is noted that the actual butterfat average for the herd of 26 cows was 507 lb. Three only of the herd are of the mature class. Over 50 per cent. of this year's herd are descendants of "Chevy 13th of Melrose." The old cow lived to the age of seventeen, and left several high-producing daughters in the herd. Of these, "Windrest Chevy"—now almost eleven years of age—has twice exceeded 560 lb. butterfat. Her sire, "Edmunton Rarius," is a grandson of "Rarity 8th of Melrose," the champion test cow of 1920. "Windrest Chevy" carries in her inheritance several infusions of the blood of "Golden Fern's Viscount" and "Pretty Noble," the two imported sons of "Boutillere," a famous high yielder on Jersey Island. Among the outstanding members of the "Chevy" family are "Chevy's Cherub" (602 lb. butterfat mature), "Chevy's Maiden" (626 lb. as a junior 3), "Chevy's Beauty" (515 lb. as a senior 3), "Chevy 3rd" (551 lb. as a junior 4), "Chevy's Dainty" (533 lb. as a junior 3), and several very high-producing "first calvers." It would at first appear that cows rich in the "Chevy" inheritance were the best in the herd; but further investigation shows that equally good material exists in other lines of breeding. For instance, the three full sisters by "Gadget" (Imp.), from "Windrest Rose Marie" (618 lb. butterfat),

These junior two-year-olds each produced over 500 lb. butterfat. Top: Mr. R. M. Chirnside's "Moornmeot Fancy Starbright 6th," 507.3 lb. butterfat. Left: "Windrest Gay Marie 3rd" (Dr. A. R. Haywood), 514.4 lb. butterfat. Right: "Inverurie Countess" (Mr. J. H. Goddard), 500.3 lb. butterfat.

A group of daughters by "Gadget" (Imp.) in Dr. A. R. Haywood's "Windrest" Stud.

show equally good results. for all three have exceeded the 500-lb. level as junior cows, namely, "Windrest Gay Marie," 591 lb. butterfat as a senior 4; Windrest Gay Marie 2nd," 648 lb. as a junior 4; and this year's leading two-year-old "Windrest Gay Marie 3rd," 514 lb. "Windrest Island Goldmine," 659 lb. butterfat on her first mature yield; "Twinkle's Charm," 576 lb. as a junior three-year-old, and "Windrest Island View," 540 lb. as a junior 4 are other high producers of the herd. Since the majority of these high-producing juniors are daughters of "Gadget" it is much more rational to assume that he has played a part in the major development of the herd. The 488-lb. butterfat average of his thirteen junior daughters is a true measure of his great breeding worth. The influence of this sire, in addition to the capable management of the herd, may bring still higher honours to Dr. A. R. Haywood's "Windrest" Jersey stud.

The leading position in the section for herds under 25 cows is held by the "Banyule" herd. This herd, now of fifteen head, has the splendid average yield of 483 lb. butterfat, a figure that becomes 566 lb. when allowances are added. The herd was well served by such great juniors as "Tiddlewinks 26th" (935 lb. butterfat as a junior 4), and the 606-lb. yield of "Hawthorn 21st" at the same age. "Silvermine 124th," as a senior two-year-old, produced 523 lb. butterfat.

The excellent average yield of 562 lb. for twenty "Yarraview" Guernseys, brings this consistently high-producing herd into fourth place. The actual butterfat average for this herd was 511 lb., the second highest for the year. It is several pounds higher than the previous record for a herd of this size.

Other fine performances are the "Mornmoot" herd of 23 Jerseys (552 lb. butterfat), the "Belgonia" herd of 22 Jerseys (531 lb.), and 490 lb. by the 25 "Springhurst" Jerseys.

The Larger Herds

Among the herds of more than 50 cows, the "Maxon" herd of 69 Jerseys has the very good average of 450 lb. butterfat. This herd is closely followed by the 54 Red Polls of the Werribee Research Farm with 441 lb., and the 63 "Willow Park" Dairy Shorthorns, 422 lb. Each of these performances has much merit, when the size of the herd is considered.

Among the smaller herds the "Inverurie" Ayrshires lead the section for under fifteen cows with an over 500-lb. actual butterfat average. The consistency of this select herd is emphasized by the fact that it led this section in the previous year with a 499½-lb. butterfat average.

At Linton, Mr. R. H. Mitchell's "Clifford Farm" Jerseys have shown what big robust cows can yield in an area where high records were not to be expected; yet his herd narrowly missed the 500-lb. herd average, when allowances for junior cows are included.

At Swan Hill the "Rutland" herd of Messrs. S. Masters and Son has the creditable record of 442 lb. actual butterfat, a really good performance, when it is considered that the herd is fed entirely on home-grown fodder.

The table of herd averages on page 480 shows particulars of ownership, the number of cows in each class, and their average yield,

together with the average yield of actual butterfat and the herd average when all allowances for herd size and junior cows have been included.

The Champion Cow

Mr. J. H. Goddard's remarkable Ayrshire cow "Inverurie Blue Bell" produced 18,116 lb. milk and 826 lb. butterfat. One factor that favoured these high-production figures, no doubt, was that she was milked thrice daily during the first seven months of the test period. Research on the question of whether milking more frequently increases yield, indicates an increase of from 20 to 30 per cent. when a third milking is introduced, and approximately 15 per cent. more from a fourth milking. Usually the extra milkings are associated with additional feeds of rich, concentrated food.

That "Inverurie Blue Bell" is a very remarkable cow is best seen in her daily weight of more than 60 lb. milk as a three-year-old, a yield that rose to over 8 gallons on thrice-a-day milking. Her dairy aptitude is perhaps better seen in her aggregate yield of 59,653 lb. milk and 2,707 lb. butterfat under test before reaching maturity. These figures are more simply stated as 27 tons of milk, and 1¼ tons butterfat. "Inverurie Blue Bell's" milk weight, at the conclusion of each test, shows that the amount stated is far from her true yield to date, although it is over 60 times her present live weight.

The new champion began her test career as a 515-lb. butterfat junior two-year-old. Recalving as a senior two-year-old, she produced 602 lb. butterfat, and then went on to produce 770 lb. butterfat as a senior three-year-old. This yield brought her the distinction of Reserve Champion Test Cow in 1941.

It is interesting to note that "Inverurie Blue Bell's" fourth calf was born before she had reached her fifth birthday; further, that she is expected to recalve within fifteen months from the beginning of her recent championship yield. Each of her yields to date are State Ayrshire records for the age when made.

It is also interesting that no other junior cow of any breed has exceeded her aggregate yields of milk and butterfat. Her remarkable performance is further referred to in the report on the Advanced Register, where she is now the leading cow over all breeds. Reference to her breeding is also made in that section.

During the test period, "Inverurie Blue Bell" received 1 lb. of mixed concentrates to approximately 5 lb. of milk. She was fed four times a day, and was grazed on several paddocks of pasture and red clover, where a modified system of rotational grazing was practised. Her paddock feed was increased by the addition of oaten chaff, mixed with green material such as maize, red clover, and oats. During inclement weather, and when the nights were cold, "Blue Bell" was rugged, as most good cows are when making high yields.

The mature Jersey cow "Windrest Rose Marie," 618 lb. butterfat.

Reserve Champion Cow

Four years ago, the Guernsey heifer "Yarraview Le Mode" came into prominence by making a junior two-year-old record of 563 lb. butterfat—a figure that still stands as the State record for the age. "Le Mode" then lost a year, but recalved as a junior four-year-old, producing 11,246 lb. milk and 738 lb. butterfat. Finishing late in the present year she gave the remarkable yield of 11,840 lb. milk, testing 6·89 per cent., equal to 816 lb. butterfat. An unusual feature of this cow is her exceptionally high test.

In third place is one of the most precocious young cows ever to enter the Standard Herd

Test. This heifer, "Finchley Bluebell's Duchess," is a twin, and led the 1941 junior two-year-old class with a yield of 535 lb. butterfat. This year she leads the junior three-year-olds with the exceptional yield of 13,449 lb. milk and 802 lb. butterfat A significant feature of this yield—which is an Australian record for the age—is the remarkably high milk weight on the last official test day, namely 50 lb.

The performance of "Finchley Bluebell's Duchess" is made even more noteworthy by the fact that she was machine-milked twice daily, and ran with the herd throughout the year; and, also, that she is expected to recalve in about a year from the commencement of her great record.

Capt. A. E. T. Payne's Guernsey cow "Yarraview Le Mode," the reserve champion (816 lb. butterfat).

No fewer than seven of the champion herd are included in the various classes. A full sister to "Finchley Bluebell's Duchess," "Finchley Master's Bluebell," holds second place in the junior four-year-old section with 750 lb. butterfat; while "Selsey Free Girl" holds a similar place in the senior-four class with 745 lb. "Finchley Lillian 3rd" is second in the junior three-year-old section, while two "Nasturtiums" are included in the two-year-old classes.

In addition to leading the mature section with the 815-lb. record of "Yarraview Le Mode," the "Yarraview" Stud occupies third place with "Yarraview Julie" (707 lb. butterfat). This stud also leads the senior-three class with "Benefactoress" (656 lb.), while "Rougette," the sensational senior two-year-old, has broken the butterfat record for this age, her 15,992 lb. milk yield being an Australian Guernsey record for any age. It is interesting to relate that "Rougette" was rejected as a springer by a buyer, who claimed to be a good judge of a dairy cow, yet her 731-lb. butterfat record as a "second calver" followed this rejection.

The "Junette" family of the "Belgonia" herd is a remarkable one. "Belgonia Junette" has twice exceeded the 500-lb. level of butterfat; while two of her daughters by "Design's Ruler" (Imp.) have exceeded the 600-lb. mark. One of these, "Junette 5th," is third among the senior four-year-olds with a 713-lb. yield. "Junette 7th," by "Air High" (Imp.), is third in the senior two-year-olds with 560 lb., while "Gem's Noella 4th"—a paternal half-sister—is sixth in the junior three-year-old class with a 563-lb. yield.

The "Windrest" herd is well represented by "Island Goldmine," 602 lb. butterfat, as a junior four; while "Iris Sunbeam" and "Twinkle's Charm" each have junior-three yields of 567 lb. "Gay Marie 3rd"—leader in the junior-two class—with the splendid record of 514 lb., and "Chevy's Betty," 482 lb., sixth in the same class are outstanding.

The "Inverurie" Ayrshires are prominent also, for in addition to the champion test cow "Inverurie Blue Bell," with 826 lb. butterfat, "Hester" has 593 lb. as a junior four; while "Countess" is one of the small number of junior two-year-olds to exceed 500 lb. butterfat.

Cows Exceeding 500-lb. Butterfat Level.
Classified.

Class.	Over 900 lb.	800 to 900 lb.	700 to 800 lb.	600 to 700 lb.	500 to 600 lb.	Total.
Mature ..	..	1	2	15	71	89
Senior 4 ..	..	1	2	3	16	22
Junior 4 ..	1	..	1	3	14	19
Senior 3 ..	..	..	..	1	13	14
Junior 3 ..	..	1	..	1	10	12
Senior 2 ..	..	..	1	..	5	6
Junior 2 ..	..	..	..	..	3	3
Total ..	1	3	6	23	132	165*

* Grand Total.

Capt. A. E. T. Payne's senr. 2-yr.-old Guernsey "Yarraview Rougette" (731 lb. butterfat).

The "Mornmoot" Stud has a really good cow in "Fancy Starbright," which occupies a prominent position in the Advanced Register. Her daughter, "Fancy Starbright 6th," has begun well by producing 507 lb. butterfat as a junior two-year-old. "Mornmoot Mimi," with 660 lb., is fourth in the senior four-year-old section. This daughter of "Werribee Mimi"—which produced over 600 lb. butterfat on two occasions—also had records of 413, 542, and 610 lb. before reaching maturity.

There are many other great yields among the 132 cows that exceeded 500 lb. butterfat, and particularly among

List of Cows Over 600 lb. Butterfat.

Owner.	Name of Cow.	Class.	Breed.	Butterfat.
				lb.
Banyule Pty. Ltd. (C. G. Lyon)	Banyule Tiddlewinks 26th	Junior 4	Jersey	935
Goddard, J. H.	Inverurie Blue Bell	Senior 4	Ayrshire	826
Payne, A. E. T.	Yarraview Le Mode	Mature	Guernsey	816
Noble, T. M., and Son	Finchley Bluebell's Duchess	Junior 3	Jersey	802
Noble, T. M., and Son	Finchley Master's Bluebell	Junior 4	,,	750
Noble, T. M., and Son	Selsey Free Girl	Senior 4	,,	745
Payne, A. E. T.	Yarraview Rougette	Senior 2	Guernsey	731
Maloney, P. J.	Belgonia Junette 5th	Senior 4	Jersey	713
Prince, Mrs. H. A.	Surrey Bonnie Girl 4th	Mature	,,	707
Payne, A. E. T.	Yarraview Julie	,,	Guernsey	707
Noble, T. M., and Son	Finchley Lillian 3rd	Junior 3	Jersey	694
Atkinson, W. K.	Willow Park Duchess 30th	Mature	Dairy Shorthorn	686
Chirnside, R. M.	Mornmoot Fancy Starbright	,,	Jersey	675
Bennett, R. H.	Edenhope Molly Madeira	,,	,,	665
Department of Agriculture	Victoria Belfry	,,	Friesian	664
Williams, Estate of the late F. A.	Bamawm Primrose	,,	Jersey	663
Chirnside, R. M.	Mornmoot Mimi	Senior 4	,,	660
Payne, A. E. T.	Yarraview Benefactoress	Senior 3	Guernsey	656
Clark, P. W.	Tooronga Aldan's Wyandotte	Senior 4	Jersey	648
Powell, T. S.	Mornmoot Northwood Madeira 3rd	Mature	,,	626
Lyon, W. H.	Avon Jasmine	Senior 4	,,	626
Goddard, J. H.	Inverurie Maggie	Mature	Ayrshire	625
Noble, T. M., and Son	Finchley Vasilika 3rd	Junior 4	Jersey	624
Masters, S. H., and Son	Rutland Brunette 16th	Mature	,,	618
Haywood, Dr. A. R.	Windrest Rose Marie	,,	,,	618
Williams, Estate of the late F. A.	Bamawm Fancy Gem	,,	,,	616
Grice, C. S.	Belgonia Suspense 6th	,,	,,	615
De La Rue, N. C.	Lucerne Vale Master's Queen 2nd	,,	,,	615
Noble, T. M., and Son	Finchley Master's Canary 2nd	,,	,,	608
Banyule Pty. Ltd. (C. G. Lyon)	Banyule Hawthorn 21st	Junior 4	,,	606
Haywood, Dr. A. R.	Windrest Island Goldmine	,,	,,	602
Haywood, Dr. A. R.	Windrest Chevy's Cherub	Mature	,,	602
Vagg, E. J.	Rydon May Queen 2nd	,,	,,	600

the 33 that exceeded the high level of 600 lb. These are shown in the table on the previous page.

It is not pretended that this list should be anything more than a sequence of the names and yields of the 33 highest producers of the year. Reference to the Annual Herd Report of each owner; or to the Advanced Register, will provide much more extensive data concerning the breeding, as well as details of all previous yields of butterfat. This data, together with a visit to the stud to inspect the individual cows or families, is of great importance to interested buyers. The Standard Herd Test Annual Report is drawn up and issued to assist breeders and farmers in this work.

THE SIX LEADING COWS IN EACH SECTION.

Owner.	Name of Cow.	Class.	Breed.	Butterfat.
				lb.
Payne, A. E. T.	Yarraview Le Mode	Mature	Guernsey	815·5
Prince, Mrs. H. A.	Surrey Bonnie Girl 4th	,,	Jersey	706·6
Payne, A. E. T.	Yarraview Julie	,,	Guernsey	706·5
Atkinson, W. K.	*Willow Park Duchess 30th	,,	Dairy Shorthorn	685·9
Chirnside, R. M.	Mornmoot Fancy Starbright	,,	Jersey	675·3
Bennett, R. H.	Edenhope Molly Madeira	,,	,,	664·8
Goddard, J. H.	*Inverurie Blue Bell	Senior 4	Ayrshire	825·7
Noble, T. M., and Son	Selsey Free Girl	,,	Jersey	744·5
Maloney, P. J.	Belgonia Junette 5th	,,	,,	713·2
Chirnside, R. M.	Moornmoot Mimi	,,	,,	659·9
Clark, P. W.	Tooronga Aldan's Wyandotte	,,	,,	648·1
Lyon, W. H.	Avon Jasmine	,,	,,	625·9
Banyule Pty. Ltd.	Banyule Tiddlewinks 26th	Junior 4	Jersey	935·3
Noble, T. M., and Son	Finchley Master's Bluebell	,,	,,	749·8
Noble, T. M., and Son	Finchley Vasilika 3rd	,,	,,	624·0
Banyule Pty. Ltd.	Banyule Hawthorn 21st	,,	,,	606·3
Haywood, Dr. A. R.	Windrest Island Goldmine	,,	,,	602·2
Goddard, J. H.	Inverurie Hester	,,	Ayrshire	593·3
Payne, A. E. T.	Yarraview Benefactoress	Senior 3	Guernsey	655·9
Mason, V. J.	Osmaine Patty	,,	,,	573·6
Prince, Mrs. H. A.	Pine Ridge Dream Girl 2nd	,,	Jersey	570·5
Shearman, A. and W.	Darnum Park Buttercup	,,	,,	561·5
Colenso, L. W.	Normandie Hawthorn 15th	,,	,,	557·1
Lind, A. E., and Sons	Latrobe Statuette 5th	,,	,,	537·9
Noble, T. M., and Son	Finchley Bluebell's Duchess	Junior 3	Jersey	802·0
Noble, T. M., and Son	Finchley Lillian 3rd	,,	,,	694·2
Prince, Mrs. H. A.	Pine Ridge Molly 4th	,,	,,	577·8
Haywood, Dr. A. R.	Windrest Iris' Sunbeam	,,	,,	567·4
Haywood, Dr. A. R.	Windrest Twinkle's Charm	,,	,,	567·2
Maloney, P. J.	Belgonia Gem's Noella 4th	,,	,,	562·5
Payne, A. E. T.	*Yarraview Rougette	Senior 2	Guernsey	731·2
Chirnside, R. M.	Mornmoot Princess Madeira 17th	,,	Jersey	581·2
Maloney, P. J.	Belgonia Junette 7th	,,	,,	560·2
Thomas and Taylor	Jennewar Nora	,,	Ayrshire	530·2
Banyule Pty. Ltd.	Banyule Silvermine 124th	,,	Jersey	523·0
Noble, T. M., and Son	Finchley Nasturtium 9th	,,	,,	514·0
Haywood, Dr. A. R.	Windrest Gay Marie 3rd	Junior 2	Jersey	514·4
Chirnside, R. M.	Mornmoot Fancy Starbright 6th	,,	,,	507·3
Goddard, J. H.	Inverurie Countess	,,	Ayrshire	500·3
Noble, T. M., and Son	Finchley Nasturtium 12th	,,	Jersey	488·0
Enders, N. H.	The Wattles Myra 10th	,,	,,	484·6
Haywood, Dr. A. R.	Windrest Chevy's Betty	,,	,,	481·6

* Milked three times a day.

[Continued on page 478.

Increased Sugar Beet Acreage Essential

. . . HIGHER PRICE OFFERED

THE importance in the national interest of growers planting sufficient beet to enable the Maffra Beet Sugar Factory to operate during the coming season was emphasized at a meeting of the Maffra Beet Growers' League held at Maffra on Friday, 14th August.

Mr. Fulton, M.L.A.; the President of the Shire Council, Mr. G. Batchelor; Mr. J. Brake, Agricultural Superintendent; and Mr. P. Ryan, Chief Inspector of Agriculture, said that the Government regarded the growing of beet for sugar production as war work of major importance.

The great bulk of Victoria's sugar requirements is brought from Queensland by coastal shipping. Any interruption to that service would mean almost complete cessation of sugar supplies since the railway facilities would be fully taxed to meet military demands and for higher priority requirements.

It was essential, therefore, that Victoria should produce as much of her sugar requirements as possible.

The importance of the Factory not only to the growers but to the business interests of the district was emphasized, and it was clearly shown that it would be deplorable if this industry, which had been established on a firm basis after many years of endeavour and had proved a practical example of successful decentralization, should be temporarily abandoned because of the difficulties occasioned by the war.

The Victorian Government regarded the growing of beet for sugar production as of such vital importance that it had agreed to pay the growers an increase of 3s. per ton for beet over last year's rates provided 2,500 acres of beet or more were sown, with an additional 1s. per ton if the area sown reached 3,500 acres or more.

Fear of inability to obtain sufficient labor for the thinning and topping of the beet crop had been a serious factor in preventing growers from applying for their accustomed acreage or increasing it, but at the meeting a telegram was read from the Director of Agriculture, Mr. H. A. Mullett, who was attending a meeting of the Standing Committee at Canberra, stating that he had been assured by the Deputy Director of Man-power that sufficient labour would be provided for the thinning and topping of the beet crop.

The Chairman of the Liquid Fuel Control Board had also given an assurance that suitable arrangements would be made to provide sufficient transport for the cartage of beets from the farm to the factory and arrangements have been made whereby growers of beet will be assured of their normal quantities of fertilizer.

The following resolutions were adopted by the meeting :—

> "This meeting of beetgrowers is of the opinion that the maintenance of beet growing for sugar production is absolutely dependent upon an adequate supply of seasonal labour and that the prices and conditions as set out in the letter from the Director of Agriculture be accepted provisionally ; in view of the assurance from the man-power authorities that adequate seasonal labour will be provided, it pledges its full support to the campaign to secure the acreage necessary for the continuance of factory operations in the coming season."
>
> "That this meeting asks the Minister of Agriculture to urge the Federal authorities to regiment the control of alien labour for the production of sugar beet."
>
> "That the Deputy Director of Man-power be informed that this meeting appreciates that provision has been made for labour for thinning and topping during the coming season, and assures the authorities that the labour will be used to the best advantage ; and that he be further requested to make man-power available for preparatory work."

At the conclusion of the meeting the committee of the Beet Growers' League agreed that the district should be zoned and a member of the committee, with an officer of the Department of Agriculture, should canvass each zone to obtain increased acreage.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows

DURING a good season like the present, when there is an abundance of succulent, immature green feed available, supplementary hand feeding is often dispensed with too soon. When this is done the dairy cow will become undernourished, because, with so much water and immature food material in the young pasturage, the cow cannot digest sufficient to supply her full requirements. During this stage of growth the raw materials from which the proteins, fats, carbohydrates and fibres are synthesized, have laxative effects which hasten the food through the digestive system before all the nutrients can be digested and absorbed. In this rush through the bowels many of the digestive juices are also washed out, adding to the drain on the resources of the cow and making the continued secretion of digestive juices difficult. This is because many of the elements usually reabsorbed lower down in the digestive tract are excreted and lost.

In good seasons, the dry stock usually appear in good condition, but are very susceptible to physiological diseases such as preparturitional (precalving) paralysis, bloat and milk fever. When milking they lose condition rather rapidly until the grass reaches a more mature stage of growth.

The stock usually are very loose in the bowels, even though they may not be scouring unduly, and the supply of any food that will rectify this condition is desirable. For this purpose the best foods are mature ones, such as ground grain, pollard, and good-quality hay or chaff, in which the crude proteins, fats, and carbohydrates are fully synthesized.

To reduce trouble during this period, the dry stock should be given a small allowance, up to 5 lb. per head, of hay daily, and milkers should be given some crushed grain as well. Crushed oats are the most common crushed grain fed, and most farmers are fully acquainted with their value as a food for dairy cows. However, ground barley and ground wheat are equal to crushed oats when mixed with a small quantity of chaff to prevent them making a paste while being eaten and in the paunch. At the present time, barley will be slightly cheaper than wheat, and both are slightly cheaper than oats.

The amount to give each cow will depend upon the paddock feed available. Where there is sufficient growth of paddock feed for the cows to graze their fill, 2 lb. of chaff, 2 lb of ground barley, and ¼ lb. of meatmeal, or other equivalent foods, should be sufficient for a 3 to 4 gallon cow at each feed, and as little as half these quantities for a 1 to 2 gallon cow. On very short pasturage up to three or four times these amounts of food may be necessary to keep the cow in full production until the grass gets more body in it.

Beef Cattle

At the leading fat cattle sales overseas, cattle are weighed immediately before or during sale, and are then auctioned at so much per 100 or 112 lb. live-weight. There is no guessing the weight. To arrive at the dressed-weight, all the buyer has to do is estimate the dressing percentage, which does not vary very much below 50 per cent. for very poor choppers or above 60 per cent. for prime bullocks.

In England, prime bullocks and heifers are fetching up to 75s. (sterling) per 112 lb. live-weight (fixed prices), making a 1,200-lb. steer worth approximately £50 (Australia). In the United States of America, the price for prime bullocks is 14 dollars for 100 lb. live-weight, making a similar steer worth about £51. In Canada, prices are lower, being about 11½ dollars per 100, making the bullock worth about £42 (assuming the Canadian dollar is equal to the United States dollar). At Newmarket, it is estimated that up to 60s. per 100 lb. dressed-weight is being paid for light prime beef, and, therefore, a bullock with a live-weight of 1,200 lb. and dressing 700 lb., would bring £21.

Beef costs more to produce in England, Canada, and most parts of the United States, because the stock have to be hand fed, and frequently housed during the long, cold winter. When stock have to be hand fed and housed, pork is the cheapest meat to produce, followed by beef, mutton, and lamb, in that order.

In Australia, mutton is the cheapest meat produced, followed by beef, and then lamb and pork. The cost of producing lamb and mutton increases rapidly when sheep have to be housed, because they require fairly concentrated foods, and do not convert their food efficiently into meat. Under such conditions pigs and cattle make a good combination, because pigs, although they require grain and other concentrated foods, produce more meat from their food than any other domestic animal. The cattle are maintained through the winter on the straw and other coarse foods which are unsuitable for pigs.

In this country, beef prices have always been too low to induce grain growers to keep more cattle, and harvest the straw to feed with a small amount of grain and a protein supplement when necessary. This state of affairs must continue while Australia can produce beef cheaply on pasture, although there is scope for some supplementary feeding of beef cattle in Victoria, where the demand for prime beef very frequently is greater than the supply.

Sheep

Sheep owners are in the midst of their busy period, and the ease and efficiency with which the work is performed depends very largely on how carefully it has been planned. Lambing is almost completed, but the ewes and lambs, particularly the stud and fat lambs, require close attention, so that setbacks to their development may be avoided. Because of transport difficulties and possible bottlenecks at the works where fewer slaughtermen are operating, the marketing of fat lambs may present a problem if it is not firmly arranged well in advance.

A surplus of lambs is expected and, as a very large proportion of this surplus will have to go into store at the guaranteed price, owners are being advised to market their lambs earlier and at lower weights. This should increase the number of lambs consumed locally.

Fat lamb raisers should not lose sight of the possibility of a good market for old lambs next autumn and winter.

The selection and classing of flock and stud sheep should be finalized before shearing. Thorough preparations should be made for a smooth run at shearing. Men, whose services are required elsewhere, are held up by avoidable hitches, and delays must not be allowed to extend shearing into the prohibited periods as set out under the National Security (Man Power) Regulations.

Tying up Horses

Although it sounds a very simple matter to tie up a horse, it is essential that certain precautions be taken to ensure that the animal does not break loose or become injured by the halter.

In selecting a halter, see that it will hold the horse in spite of his efforts to get loose, otherwise he may develop into a confirmed

halter breaker. Fitting a throat lash prevents the halter being rubbed off. Always ensure that the rope will not tighten on the jaw, by tying a knot in the lead rope between the loops of the cheek pieces or by taking a half-hitch round the near side cheek strap.

When securing the lead to a post or ring, make sure that it is tied so that it will not slip loose, and also that it will not jam if the horse pulls back.

There are several safe knots, but the best is the bowline, which will not slip and can be untied easily. A clove hitch, using a looped end for the second half-hitch is a very useful knot, as by simply pulling the free end of the rope forming the loop will release the knot at once. This is known as a quick-release knot.

Now that air raids are a possibility, it is very necessary to know how to tie up a horse safely—also to be able to untie it in an emergency.

When tying up a horse, allow only enough slack to enable the animal's head to reach the ground.

[W. M. Lerew, G.M.V.C., Veterinary Officer.]

Pigs

Prolificacy, growth rate, carcass quality, and economy of food conversion are the four main factors on which pigs are valued. These characteristics are dependent on heredity and environment, and, therefore, the art of pig raising requires the selection of breeding stock carrying these desirable hereditary characteristics and then the provision of an environment favorable for their development.

The environment should provide for health, freedom from parasites, protection from extremes of climate, and an adequate balanced food supply.

By weighing litters, pig raisers can provide themselves with valuable information on the prolificacy and milking capacity of their brood sows and the inherent growth rate of their progeny, as well as check the methods of feeding and management.

The total litter weight at eight weeks old is generally considered the best single measure of production. Litter weights vary considerably. In the Victorian Pig Raising Competitions of 1940 and 1941, when 51 litters were recorded, the litter weights at 56 days old ranged from 160 lb. to 453 lb., the average being 318·4 lb. Such a range indicates vast scope for the selection of the more productive families, as well as for improvement in feeding and management.

The outstanding litter of "Promview Superior 50th."

An Outstanding Litter.

The "Clarendon" stud of Mr. L. H. Castle, Clarinda, recently produced a litter of twelve pigs which weighed 526 lb. when 56 days old. This performance is outstanding as an example of good breeding, feeding, and management.

The dam of this litter, "Promview Superior 50th," was purchased by Mr. Castle at the Melbourne stud pig sale in 1940 for 19 guineas, her breeders being Messrs. Trenery and Soderlund, "Promview," Foster. "Promview Superior 50th" soon paid for herself by rearing her first litter of twelve shortly after purchase.

Her fourth litter, born on the 12th June, 1942, is the outstanding litter referred to. In this litter eighteen pigs were born, and twelve were reared. The sire of the litter was "Waroin Bladennis 9th," bred by Messrs. Keele and Son, "Waroin," Bamawm.

"Promview Superior 50th" was run on pasture and fed supplementary concentrates during most of her gestation period. Before farrowing she was brought into a pen with access to a self-feeder, containing a mixture of crushed barley, crushed wheat, and a protein-mineral supplement, to a pasture run and to drinking water.

The suckers commenced feeding at the self-feeder between two and three weeks old, and from that time were given separated milk twice daily.

[L. A. Downey, H.D.A., Pig Expert.]

Feeding Charcoal to Poultry

A great number of poultry farmers at the present time have accepted the feeding of charcoal to poultry as necessary to maintain their flocks in good health.

Experts, however, differ in their views regarding the economy of this practice and do not mention it or include it in the formulas which they consider comprise properly-balanced rations, especially in connexion with the feeding of chickens. Some poultry farmers of long experience say that they would not be without charcoal. Others again never use it now, and claim that they have never noticed any difference in the health of their birds since it was omitted from the rations.

In an experiment carried out with chickens fed on a diet found capable of promoting normal growth and health, it was found, when 2 per cent. charcoal was included, the weight and growth rate of the chickens were seriously affected, probably on account of the fact that charcoal robbed them of essential vitamins. It was shown also that charcoal caused erosion of the gizzard lining. In addition, it is claimed that charcoal absorbs the yellow pigment of foods and prevents it entering the blood stream. This yellow pigment or carotine is really vitamin A, which is required by the birds for growth and disease resistance.

As long ago as 1927, Holst and Newlon (Poultry Feeding: Principles and Practice, University of California) stated:—"Much investigational work has been carried out in order to demonstrate the benefit of charcoal feeding, but without success. It is certain that the absorbing power of charcoal has been much over-emphasized. Even if present, the absorbing power would be of questionable value. Charcoal feeding for poultry should be given up as an unnecessary expense, just as it has been abandoned in human dietetics, where it was formerly recommended."

[H. F. Clinton, Poultry Expert.]

Bees

With the spring, the brood area of colonies will increase. It is advisable, therefore, to see that no colony is short of stores. A queen will do far better work when 10 or 12 lb. of surplus stores are available, because when stores are curtailed many queens are reluctant to extend the brood nest.

If natural stores are not available, they can be supplemented by pouring sugar syrup into empty combs and placing the combs adjacent to the brood.

Colonies that are to be fed can have combs removed in the day time and returned filled with syrup at dusk. This is advisable because feeding causes excitement and a great deal of flying by the field bees. When the syrup is given at dusk, any surplus leakage is cleaned up before morning. Syrup or honey retained or fed on combs does not interfere with the normal conditions of the cluster, and little excitement is noticeable.

Supplementary feeding will stimulate brood rearing for building the colonies up early in readiness for the honey flow, or for artificially increasing the number of colonies.

When feeding, it is well to restrict hive entrances to keep out robbers.

The apiarist should have ample supplies of bee material on hand to cope with swarming and any natural increase that is desired. It is wise to be ahead of the bees, as it is a poor policy to be looking for a hive when the swarm has clustered or is on the wing.

In some localities where ample rains have promoted good growth of both forest and field flora, swarming will occur this month.

Any queens found to be failing should be replaced with good young queens bred specially for this purpose. If the apiarist has not any suitable young queens, he should purchase them from a reliable breeder.

Save Every Ounce of Beeswax.

It is imperative that every ounce of beeswax be salvaged. Practically all types of ammunition, for instance, are coated with beeswax, from rifle cartridges up to 16-inch shells. It neither expands in jungle heat nor cracks in the sub-zero cold of the stratosphere. Beeswax is used also to protect and waterproof delicate wiring and coils in aeroplanes, trucks, and tanks. Canvas and leather are waterproofed with material containing beeswax, while harness, shoes, and other leather equipment are sewn with waxed thread.

[Continued on page 459

ADVANCED REGISTER OF MERIT

Standard for Pure-Bred Cows

By W. J. YUILL, Supervisor of Herd Testing

FEW, if any, cows make profits before their second lactation. The cost of rearing a heifer for approximately two years to the calving stage, and also the cost of food, labour, and other overhead expenses during the initial year of milking, can never be met by the value of the produce obtained from even a good heifer.

The point at which profits begin to exceed costs is not easy to determine, as it may vary greatly with individual animals in any herd. It is obvious, however, that cows with many good yields will stand out sharply in contrast to those with few, even though they may be spectacular, yields. Whenever a cow is eliminated from a herd, replacement costs are incurred, and, conversely, there is a saving of such costs where cows give many years of profitable service. In Victoria the average useful life of a milking cow is estimated at about five years.

"Inverurie Blue Bell," the leading cow on the Advanced Register, with 826 lb. butterfat.

Nine cows now on the Advanced Register have recalved at least ten times. Special features of the register are the highest butterfat yield of each cow's lifetime, and her average yield of milk and butterfat. The register now contains the names of more than 40 cows with eight or more records, while quite a number have at least seven recorded yields—a figure that generally goes with ten-year-old cows. Such cows have lived and produced during the life of two average dairy cows.

Unusual Instances of Longevity

Among the old cows are two long-lived Jerseys. Born in 1921, "Antimony's Trixie of Belle Vue" finished her twentieth year before she was destroyed. During the last nine years of her life she was tested by Messrs. J. Moore and Co., of Yarram. Her best four years gave her an Advanced Register ranking of 454 lb. These good figures doubtless were lower than "Trixie" was capable of in her earlier years.

"Taranah Fairy," in her twentieth year, is still milking and under test in the herd of Mr. J. J. Desmond, of Rochester. Calving first in 1925, she has recalved annually, and has the remarkable average yield of 484 lb. butterfat during the twelve years she has been under test.

During the year—when not in calf—"Linga Longa Wattle Speck," at the age of sixteen years, produced 598 lb. butterfat, a great yield at her age. This yield, however, is by no means as important as her aggregate yield of nearly 3 tons of butterfat, made during her fourteen years of production.

In the stony country north of Colac "Normandie Buttercup 2nd" has a 412-lb. butterfat average over a spread of eleven years,

a great performance when the nature of the area is considered. "Booreen Silver Light" (438 lb.), "Maryville Eve," a fourteen-year-old Red Poll from Swan Hill (422 lb.), "Sylvan Hill Handsome Girl," "Sylvan Hill Lady Alma," "Tiny 3rd of Beverley," and the Dairy Shorthorn "Willow Park Duchess 7th" have all completed ten lactations.

"Mornmoot Fancy Starbright," a cow prominent on the Advanced Register. Her average yield for seven years is 611 lb. butterfat.

Thirty Cows have Eight or more Records

Of the 30 cows with eight or nine records, nine are in the higher section. They are headed by "Mornmoot Princess Madeira" "Ballara Bonnie." Although the former cow has enjoyed great publicity because of her top ranking on the Advanced Register, there is less than 20 lb. difference in the average yields of the two cows. In addition to their splendid yields, these cows each have produced great progeny.

"Victoria Flirt," "Willow Park Comet 7th," "Leven Brae Gay Countess," "Sylvan Hill Beauty," "Kantara Jessamine," "Warwick Augustus Marie," and "Inverbroom Silver Muriel" also stand out among pure-bred cows as being dairy cows of an unusual order.

"Finchley Canary 3rd," with an eight-year average of 532 lb. butterfat, leads the "Clifford Farm" cow "Gladsome" by 21 lb., but the performance of the latter stands out in that it has been made in an area where records are difficult to achieve. Three "Willow Park" cows, namely, "Damsel 2nd" (480 lb.), "Countess 9th" (450 lb.), and "Countess 10th" (454 lb.), represent the Dairy Shorthorns; while "Glencorren Violetta" (407 lb.) and "Avon View Dulcie" (387 lb.) represent the Ayrshires and the Guernseys respectively among the eight-year performances.

New Advanced Register Champion

In the Standard Herd Test report for 1941 it was stated that some records which had stood for many years were in danger of eclipse. In this regard "Willow Park Cherry's" 600-lb. average yield for ten years may be exceeded in the near future; while the 810-lb. Advanced Register ranking that has given "Mornmoot Princess Madeira" such a long lead over all others has now been exceeded by Mr. J. H. Goddard's Ayrshire cow "Inverurie Blue Bell." Just how long the new record of 826 lb. butterfat will stand will depend largely on the sustained efforts of junior cows like "Finchley Bluebell's Duchess" and "Yarraview Rougette."

Mr. J. J. Desmond's Jersey cow "Taranah Fairy," now in her twentieth year. Her twelve year average is 484 lb. butterfat.

The new champion Advanced Register cow "Inverurie Blue Bell," has given unqualified evidence of her right to the position, for her initial four yields, when corrected for age, give the highest ranking ever recorded in the register. "Blue Bell" is not a freak cow, for she is the result of selective breeding over

several generations. Her dam is the beautiful Ayrshire cow "Donside Thistledown 2nd," and her sire's dam is her half-sister "Donside Lydo Lady." These two cows have occupied the two leading positions in the Ayrshire section of the Advanced Register. Because of their heavy milking, and the desire to preserve the udder from injury, all three cows have at times been milked thrice a day, "Thistledown 2nd," however, has been displaced by another great producer, namely, "Inverurie Maggie"—twice over 600 lb. butterfat. "Inverurie Maggie" is similarly bred to "Lydo Lady," their respective dams being full sisters. "Oakbank Radio," who sired "Inverurie Maggie," is also the sire of "Laddie," whose daughter "Inverurie Blue Bell" is the new champion. "Inverurie Blue Bell," therefore, carries the inheritance of two proved sires, namely, "Oakbank Radio," who has many good daughters at Inverurie, and a concentration of "Olivedale Chum," the sire of her dam and sire's dam. It is not necessary to go further back into "Inverurie Blue Bell's" pedigree to seek the reason for her greatness, as her reputation as a consistent producer is enhanced by the fact that her daughter, "Inverurie Bell," was one of the top-ranking Junior two-year-olds in the 1942 Standard Test Annual Report. A special feature of the new champion is her remarkably well-hung, evenly-balanced, capacious udder.

Of the 343 names now on the register, no fewer than 43 obtained their ranking on the first four yields. Among these junior cows there are some very unusual performers. "Belgonia Junette 5th" and "Mornmoot Mimi" can be expected to occupy even higher positions in the future, for natural wastage will eventually remove some of the great cows now at the head of the list. "Junette 5th" has a full sister on the register, while "Mornmoot Mimi" is from "Werribee Mimi," a cow which has twice produced over 600 lb. of butterfat.

G. A. McNabb and Son's "Maxon Count Graceful" (6754). This bull has sired twelve Advanced Register cows.

Information on many great sires, as well as cows, is available in the register for breeders and farmers who study the inheritance and productivity of the lines of breeding they are using. To supply this information is the chief function of the Advanced Register.

A full list of cows which have qualified to be placed on the Advanced Register of Merit appears at the end of this issue.

LIVE STOCK NOTES—*continued from page 456*

Beekeepers, therefore, may assist the war effort in a very substantial way by producing beeswax to the limit of their resources.

The price-fixing authorities have fixed the price of clean wax at 2s. 6d. per lb., a very payable figure.

American apiarists have been asked to use one comb less in their supers. This results in a fatter comb being built, and if uncapped even with the wood, a great deal more capping wax is obtained. American apiarists also have been asked to make it a practice of scraping all burr or brace combs from the frames whenever they open up a colony, and during the entire season to look for and discard poor and damaged combs, which have a greater value in the form of beeswax.

A wax-rendering plant with a press is somewhat costly if there is not the quantity of slumgum and old comb to process, but by co-operating small beekeepers could establish a wax-rendering and precessing centre, and make very real contribution to the war effort.

[W. A. Collins, Apiary Inspector.]

Poultry Feeding Tests

1941-42 Results

By
W. O. PEDERICK
and A. G. CLARK

EXTENDING over a period of twelve months from the 1st April, 1941 to 31st March, 1942, poultry feeding tests were conducted at the State Research Farm, Werribee. The object of the tests was to gain more information on the value of feeding greenstuff. For the purpose, five hundred Australorp and White Leghorn pullets, hatched during August and September, 1940, were used. The pullets were divided into ten pens, five of Australorps and five of White Leghorns. Each pen contained 50 birds. During the whole test period, all the birds were confined within the laying-shed pens, with slightly more than four square feet of floor space for each bird.

The birds in each pen were given the same quantities of both wet mash (pollard—60 parts by weight, bran—30 parts and meat meal—10), in the morning, and mixed grain (wheat—60 parts by weight, oats—20 parts, maize—20 parts, and barley—10 parts) in the evening, but the quantity of greenstuff fed to the birds in the different pens was varied as follows:—

Pens 1 and 10.—Greenstuff in the morning mash and in troughs in the afternoon.

Pens 2 and 9.—Full ration of greenstuff in troughs in the afternoon.

Pens 3 and 8.—Half ration of greenstuff in troughs in the afternoon.

Pens 4 and 7.—Full ration of greenstuff in troughs in the afternoon for the first six months, and then no greenstuff whatever for the second six months.

Pens 5 and 6.—No greenstuff during the tests

The nature and amount of greenstuff fed to the birds in each pen is set out in the table on page 462.

Each bird on a full ration of greenstuff consumed approximately 1½ oz. per day.

The results of the tests are set out in the second table which shows the quantities and cost of the foods consumed, the number and value of eggs laid, the return over food cost, and the mortality in each pen.

As in previous years the cost of the food was arrived at by taking the average wholesale price published in the daily press during the year without adding delivery charges. The cost of the greenstuff has not been taken into consideration. The eggs laid were all valued at the gross wholesale "hen" egg prices without deducting any marketing charges.

In each case, dead birds were replaced with birds of similar age and breed, maintained on standard (not test) rations.

The differences in egg production between the birds receiving the varying amounts of greenstuff was not as great as expected. The

pen of Australorps which received greenstuff for the first six months of the trial only, laid the largest number of eggs (197·6), whereas the White Leghorns receiving exactly the same rations laid the lowest number of eggs (172·8). The lowest-producing pen of Australorps (183·8 eggs), and the second lowest producing pen of White Leghorns (174·4 eggs), received no greenstuff during the tests. In comparison, the Australorps and White Leghorns, which received full rations of greenstuff in troughs each afternoon averaged 195·9 and 178·3 eggs respectively. In both cases the birds which received greenstuff in the mash as well as in the trough laid fewer eggs than those which received a full ration of greenstuff in the trough only. The birds receiving a half ration of greenstuff laid as well as those receiving the full ration.

Mortality was heavier than usual during the year. Sixty-six birds died—18 in the two pens receiving no greenstuff, 15 in the pens receiving greenstuff for six months only, 12 in the pens receiving a half ration of greenstuff, 11 in the pens receiving a full ration of greenstuff, and 10 in the pens receiving greenstuff in the mash as well as the trough, but only in eleven cases was death diagnosed as being caused by avitaminosis, a nutritional deficiency disease brought about by the absence of vitamin A. These eleven deaths all occurred towards the conclusion of the tests. The principal reason for feeding greenstuff to poultry is to provide vitamin A. Ten of the deaths caused by avitaminosis were in the no greenstuff pens and the other death was in a pen which had received greenstuff for the first six months of the tests only.

At the conclusion of the tests all the birds not receiving a full ration of greenstuff were clinically examined for lesions in the throat which would indicate the presence of avitaminosis. It was found that 39 per cent. of the birds receiving no green feed were affected, 22 per cent. of those receiving a full ration of green feed for the first six months and then none, and 18 per cent. of those which received a half ration of green feed throughout the year.

Officers of this Department have always advocated the feeding of a plentiful supply of succulent green feed each day and, although the results of the tests support them, in that fewer eggs were laid, more birds died, and more birds were suffering from avitaminosis when the supply of greenstuff was reduced or omitted, the results were not as spectacular as expected. However, the fact that all the birds in the test had been reared on free range and had received plenty of greenfeed until the commencement of the tests, when they were 7 to 8 months old, may have had some bearing on the results. The effects of avitaminosis amongst the birds not receiving greenstuff were becoming very apparent at close of the experiment. If the tests had been continued a little longer, heavy mortality may have occurred.

Greenstuff is fed as a supplement to maintain the health of the birds and not as a substitute for any of the ingredients of the mash or grain mixtures. In these tests the birds in all the pens were given and ate the same amount of mash and grain, irrespective of the amount of greenstuff supplied.

Apart from showing the effects of varying the quantities of greenstuff fed, the tests permitted a comparison to be made between the Australorp and White Leghorn breeds. Birds of both breeds received the same amount of feed. The Australorps laid an average of 189·6 eggs per bird and the White Leghorns 176·7 only, but the White Leghorns averaged 55·4 eggs during the four months April to July inclusive, compared with 52·4 eggs from the Australorps. As a general rule, Australorps lay better then White Leghorns during the winter months.

The average monthly production of the birds of both breeds during 1941-42 and during the six-year period 1936-37 to 1941-42, is set out in the following table:—

AVERAGE MONTHLY PRODUCTION OF AUSTRALORPS AND WHITE LEGHORNS

Month.	1941–42.		Six years, 1936–37 to 1941–42.	
	Australorps.	White Leghorns.	Australorps.	White Leghorns.
	Eggs Per Bird.	Eggs Per Bird.	Eggs Per Bird.	Eggs Per Bird.
April	12·5	14·2	14·3	14·3
May	14·9	15·7	14·9	14·4
June	13·5	13·2	14·3	12·9
July	11·5	12·3	14·7	13·3
August	16·6	16·9	17·1	15·9
September	22·3	19·3	19·6	19·2
October	22·0	20·0	19·8	20·0
November	20·2	18·8	17·2	18·6
December	17·7	15·9	15·6	17·3
January	15·7	13·6	14·7	16·2
February	11·3	9·9	12·5	13·0
March	11·3	6·8	12·0	10·7
Average per bird for twelve months ..	189·6	176·7	186·7	185·8

Statement Showing Nature and Amount of Green Feed Fed to Each Pen

Nature of Green Feed.	Pen 1.		Pen 2.		Pen 3.		Pen 4.		Pen 5.		Pen 6.		Pen 7.		Pen 8.		Pen 9.		Pen 10.	
	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st Six Months.	2nd Six Months.	1st six Months.	2nd Six Months.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Green Oats	790	..	790	..	395	..	790	..	..	..	..	..	790	..	395	..	790	..	790	..
Pasture ..	95	500	95	500	47½	250	95	..	..	..	..	..	95	..	47½	250	95	500	95	500
Lucerne ..	..	410	..	410	..	205	..	..	..	..	..	..	..	..	..	205	..	410	..	410
Totals ..	885	910	885	910	442½	455	885	..	..	..	..	..	885	..	442½	455	885	910	885	910
Grand Total	**1,795**		**1,795**		**897½**		**885**		..		..		**885**		**897½**		**1,795**		**1,795**	

Test No. 22.—Werribee Feed Tests, 1st April, 1941, to 31st March, 1942 (12 Months)

Pen Number.	50 Birds per Pen.	Method of Feeding Green Feed.	Number of Birds Died.	Green Feed.	Bran.	Pollard.	Meatmeal.	Wheat.	Oats.	Maize.	Barley.	Total Food without Green Feed.	Cost of Food.	Eggs Laid.	Value of Eggs.	Return over Food Cost.
				lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	£ s. d.		£ s. d.	£ s. d.
1	Australorps	1 lb. of green feed in morning mash, remainder fed in troughs in the evening ..	4	1,795	576	1,153	192	1,294	431	431	216	4,293	14 8 5	9,251	50 6 10	35 18 5
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**185·0**	**1 0 2**	**0 14 5**
2	Australorps	Full ration of green feed fed separately in troughs in the evening	4	1,795	576	1,153	192	1,294	431	431	216	4,293	14 8 5	9,795	53 13 7	39 5 2
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**195·9**	**1 1 6**	**0 15 9**
3	Australorps	Half ration of green feed fed separately in troughs in the evening	5	897½	576	1,153	192	1,294	431	431	216	4,293	14 8 5	9,285	50 13 1	36 4 8
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**185·7**	**1 0 3**	**0 14 6**
4	Australorps	Same as in Pen 2, but for first six months *only*, viz., April to Sept.	7	885	576	1,153	192	1,294	431	431	216	4,293	14 8 5	9,879	54 11 0	40 2 7
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**197·6**	**1 1 10**	**0 16 1**
5	Australorps	No green feed	9	Nil	576	1,153	192	1,294	431	431	216	4,293	14 8 5	9,191	50 9 11	36 1 6
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**183·8**	**1 0 2**	**0 14 5**
6	White Leghorn	No green feed	9	Nil	576	1,153	192	1,294	431	431	216	4,293	14 8 5	8,721	48 7 2	33 18 9
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**174·4**	**0 19 4**	**0 13 7**
7	White Leghorn	Same as Pen 4	8	885	576	1,153	192	1,294	431	431	216	4,293	14 8 5	8,641	47 16 11	33 8 6
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**172·8**	**0 19 2**	**0 13 5**
8	White Leghorn	Same as Pen 3	7	897½	576	1,153	192	1,294	431	431	216	4,293	14 8 5	9,054	49 17 8	35 9 3
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**181·1**	**0 19 11**	**0 14 2**
9	White Leghorn	Same as Pen 2	7	1,795	576	1,153	192	1,294	431	431	216	4,293	14 8 5	8,917	49 5 8	34 17 3
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**178·3**	**0 19 9**	**0 14 0**
10	White Leghorn	Same as Pen 1	6	1,795	576	1,153	192	1,294	431	431	216	4,293	14 8 5	8,842	48 19 11	34 11 6
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**176·8**	**0 19 7**	**0 13 10**
..	Total—500 birds	.. .. ..	..	..	..	..	..	..	..	..	..	42,930	144 4 2	91,585	504 1 9	359 17 7
		Average ..	..	..	..	..	..	..	..	..	..	**85·9**	**0 5 9**	**183·17**	**1 0 2**	**0 14 5**

Notes.—Average price of eggs per dozen, 1s. 4d. Food cost per dozen eggs, 4½d. Food consumed per egg laid, 7·5 oz. Food consumed per bird per day 3·8 oz. Cost of food per bird per week, 1·4d.

The Jerusalem Artichoke

(Helianthus tuberosus)

By K. HARRISON, Dairy Supervisor

IN Europe, hundreds of thousands of acres are planted annually to the Jerusalem artichoke, but in Australia this plant has been almost entirely neglected.

Many thousand tons of vegetables over our normal requirements are necessary for the civilian population and the Allied fighting forces in Australia. It is suggested that the Jerusalem artichoke could play an important part in the filling of these requirements.

In the past the Jerusalem artichoke has not found favour with many gardeners, mainly because of a certain weed-like persistence of reproduction, and a tendency to cause flatulence if improperly cooked and eaten to excess. But surely the persistence of the plant, its unique vigour and hardiness, could be turned to good account in times like the present.

The tuber contains a peculiar soluble carbohydrate compound upon which the digestive enzymes are incapable of working. Although much of this carbohydrate is converted into sugar by the gastric juices, the surplus, which passes into the intestine may undergo bacterial decomposition, with gas formation. However, proper methods of cooking will convert a considerable amount of the carbohydrate to sugar, and if cooked so as to retain the flavour, the vegetable will be found by most people to be both agreeable and healthful, and in no way inferior in food value to the potato. Unlike the latter, it stores up little or no starch. Research in other countries has shown it to be particularly valuable for diabetics.

Following are the characteristics and requirements of the Jerusalem artichoke:—

It is a heavy yielder, and little trouble to produce.

It may be grown successfully amongst fruit trees and in odd corners of the garden, where not too shady.

It grows well under a wide range of soil and climatic conditions, thriving in ground ranging from light sandy loam to heavy clay, and in areas too poor to support any other root crop; but, at the same time, it abundantly repays careful culture in fertile soils, worked and fertilized as for potatoes.

It does well in poultry runs, where it usually becomes perennial and affords shelter and shade.

It is drought resistant, and not susceptible to frosts, provided that the tubers are covered by soil.

The crop generally is free from pests and disease.

The tubers will wither or rot if bagged for more than three weeks. They should be dug in the autumn and pitted like potatoes (only a light covering of earth is necessary), or left in the ground and dug as required.

Rate of sowing varies from 6 to 10 cwt. per acre. Small whole tubers should be planted, 4 to 5 inches deep, in rows 2 ft. 6 in. to 3 feet apart, with 15-24 inches between plants. While it is desirable to use whole tubers for seed, they may be cut with a reasonable degree of safety if late dug and late sown.

Time of planting in Victoria is from August to October. The crop takes about five months to mature.

* *Recipes*

Preparation.—Tubers grown without proper culture are often small and irregular, and therefore tedious to pare or scrape. Both for this reason and because of their very mild flavour, baking in their own skins is one of the best methods of cooking. They must be well scrubbed with a stiff brush.

Baked Jerusalem artichokes.—Bake in skins 30 to 60 minutes according to size in slow oven. They may be served in the skins and eaten with butter. Or they may be scraped out with a fork and spoon, mashed, and seasoned with salt, pepper, and a little butter or a very little cream. They should be sweet and pleasing in flavour, if properly handled.

Boiled Jerusalem artichokes.—Boil in skins and peel afterwards. This is one of the best ways of preserving flavour. If pared before

* From *Technical Bulletin 33 U.S. Department of Agriculture.*

boiling, the vegetable should be thinly sliced, very little water should be used, and it should be boiled down almost dry at the close. Small tubers may cook tender in 15 to 20 minutes. Season with butter or cream, salt, pepper, and a little lemon juice or nutmeg if liked. The flavour is much enhanced by cooking in milk or in a good meat broth. Or boil with a tablespoon of minced carrot and a teaspoon of minced onion to each pound of tubers. Or use minced chives, shallot, leek, or celery.

Serve the boiled vegetable in cream sauce or other well-seasoned sauce. Or bake in cream sauce with a sprinkle of grated cheese. Or fry it with chopped leeks, celery tops, or parsley in a little butter, adding white sauce later if desired.

Jerusalem artichokes en casserole.—Pare, place in baking dish whole or sliced, cover closely, and bake in slow oven until done (about one-half to one hour), removing the cover of the baking dish toward the close if necessary to dry out excess moisture. Season with butter, salt, and pepper. Add grated cheese or buttered crumbs or both, when liked.

Fried Jerusalem artichokes.—Pare, slice very thinly, soak 30 minutes in cold water. Dry between towels, drop into very hot oil or lard, fry to a crisp chip. This method brings out sweetness and flavour very well. These chips, if properly made, are usually judged superior in flavour to those made from potatoes.

Jerusalem artichokes in salad.—The fresh texture of the tubers makes them very desirable in salads. Peel, slice thin, and dice. Serve as a part of a vegetable salad composed of tomatoes, cucumbers, onions, radishes, and lettuces.

Quick Jerusalem artichoke soup.—Heat 4 cups of milk in a double boiler, add 1 tablespoonful of flour creamed in 2 tablespoonfuls of butter. Lift out, place directly over the fire, and let cook to a boil to thicken. Add 2 cups of grated raw artichokes, 1¼ teaspoons salt, ½ teaspoon grated onion, and ½ teaspoon chopped parsley. Let heat through for 5 minutes and serve.

Puree of Jerusalem artichoke.—Boiled tubers may be used in preparation of puree. Prepare and cook just as you would puree of potato. Jerusalem artichokes give a surprisingly good flavour to soups of this type.

Fried Jerusalem artichokes.—Left-over boiled tubers may be mashed, formed into patties, dipped in egg and crumbs, and fried in deep fat or sauteed in butter.

Jerusalem artichoke surprise.—Pare the tubers, cut lengthwise into pieces approximately three-fourths inch in size. Dip in egg and crumbs until thoroughly coated. Fry in deep fat, until certain that the pieces are well done. The fat must not be too hot or the crumbs will burn before the artichoke is completely cooked. Place on soft paper in a pan, and put in the oven a short time in order that the fat may be absorbed.

Considering the Jerusalem artichoke as a forage crop, the following points are noteworthy:—

Approximately 6 tons of artichokes have the pig-feeding value of 1 ton of cereal meals, being superior in this respect to either turnips or mangels. Feeding experiments have shown that pigs given a free run in artichokes made a pound of gain with each 3·1 lb. of grain fed. Ordinarily it takes 4 lb. of grain to make a pound of gain.

One acre of artichokes will keep six brood sows in good condition for seven months. Twenty to 30 store pigs can be maintained in good heart for the same period, harvesting the tubers for themselves. In the wet months pigs should not be allowed free run of an artichoke crop grown on very heavy soil, as in their rooting they puddle the soil to its great detriment. Although under reasonable treatment a pig paddock sown down to artichokes can be regarded as perennial, in practice it will be found advisable to resow the crop every two years.

The young leaves and stems are sometimes cut and fed in the green state to cows and sheep, which thrive well on them; but this decreases the yield of tubers considerably.

The Jerusalem artichoke stands alone as a weed eradicator, mainly because it makes so dense a shade as to smother most competing plants. In this respect it can be used to good purpose as a forage crop for pigs in dirty country, where the rooting of the pigs has a further deterrent effect on pests, such as blackberry and bracken.

For seed tubers, the present market price is 18s. 6d. per bag of 1½ cwt. Small lots sell from 3d. to 4d. per lb.

References.

Technical Bulletin 33, U.S. Dept. of Agriculture; Standard Cyclopedia of Modern Agriculture (Wright); Farm Crops, Vol. IV. (Paterson); Farmers Cyclopedia of Horticulture (Wilcox and Smith).

In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Cultivation

SPRING cultivation will commence in most orchards during this month. Fruit growers who intend to apply fertilizers, such as blood manure, blood and bone, castor meal, poultry or farmyard manure, should endeavour to complete this work before ploughing. Applications of lime also should be completed as soon as possible. Ploughing in the spring is probably the most important time for orchard cultivation because weeds, green crops, and manures, when turned into the soil, decompose and make plant foods available to the trees. Early ploughing allows this process to take place in time for the trees to make full use of the nutrients. Another point in favour of early ploughing is that the store of soil moisture built up during the winter will diminish rapidly unless weeds, which compete with the fruit trees, are ploughed under. Growers on non-irrigated orchards will realize the importance of this fact.

Frost Protection

Blossoming of fruit trees, with its promise of a good harvest, is also a reminder to growers situated in areas subject to frost that a severe frost at this stage may destroy their crop in one night. Most fruit growers have memories of devastating frosts which are not very frequent, fortunately, but in some districts precautions in the form of orchard heaters are necessary. The old idea of filling the atmosphere with smoke from smudge fires has rarely proved satisfactory. The most practical equipment is a set of heaters and accurate thermometers. The best fuel to burn in the heaters would be either oil or briquettes.

About 50 to 60 heaters per acre of orchard are required to provide adequate protection. An alarm thermometer should be attached to a post about 4 feet above ground and situated in the coldest section of the orchard. Other check thermometers should be placed in the orchard. The alarm thermometer is usually set at 34 deg. F., so that the grower will have time to inspect the check thermometers; and if it appears that the temperature will fall much below 28 deg. F. before sunrise, the heaters may be lit before the danger period is reached. Actually, the decision to light the heaters depends on the grower's experience, but most fruits and blossoms are not damaged unless the temperature falls below 28 deg. F.

Spring Spraying

The first sprays for the control of black spot on pears will be applied this month. There should be no need to stress the importance of the pre-blossom sprays, particularly the first Bordeaux mixture spray at bud-burst. Some apple growers are still reluctant to use this spray on the Jonathan variety, but, provided it is applied at an early "green tip" stage—that is, when the tips of the young leaves are just protruding through the bud scales—very little russeting should occur. The strength of the Bordeaux spray should be 6 lb. of copper sulphate and 6 lb. of slaked lime to 40 gallons of water. A further spray of lime sulphur, strength 2¼ gallons in 80, should be applied when 5 per cent. of the blossoms have opened.

Pears should receive 6:6:40 Bordeaux sprays at the "delayed green-tip" and "finger" stages. This latter stage is recognized when the leaves are just commencing to separate from the young blossom cluster. Josephine and Winter Cole varieties should receive only the first spray.

Growers who have been unable to apply winter strength lime sulphur or red oil may include 1 gallon of red or pale oil with their first Bordeaux spray on apples and pears for the control of red spider.

So far, orange groves have been relatively free of septoria and anthracnose; but if these diseases appear the trees should be sprayed with a 3:3:50 Bordeaux mixture spray combined with half a gallon of white oil emulsion. Mottle leaf, which appears from time to time in northern citrus areas, may be controlled by a zinc-Bordeaux spray. This is made by adding 10 lb. of zinc sulphate and 5 lb. of slaked lime to 100 gallons of water.

Bees in the Orchard

Most fruit varieties require some insect to deposit pollen in the flower before a fruit will set. For blossoms which require pollen from a different variety—for instance, apples, pears, plums, cherries, and almonds—this action is most important in the setting of a good crop. If bees are scarce in some districts, it is well worth while securing hives of bees and placing them out in the orchard at blossom time.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley

September is a busy month for gardeners. Seeds of summer-flowering annuals should be sown and many herbaceous perennial plants can be planted out.

Among the annuals—aster, dianthus, salvia, gaillardia, phlox, petunia, larkspur and scabious are popular and hardy.

Perennials which have formed large clumps can now be lifted and divided and replanted after digging into the soil some well-rotted manure. Canna, penstemon, begonia, perennial aster and perennial phlox will require this attention.

Stocks

There are two main groups of stocks, one used for winter and early spring flowering and the other for summer blooms. They may be planted to provide good bedding effects in the garden and are useful cut flowers. Their fragrance is always appreciated.

The popular summer-flowering type is often called the "Ten-week Stock". The Nice and Brompton Stocks are used for winter-flowering, but the latter is not grown extensively because it requires from 10 to 12 months from seed to blossom.

The Giant Imperial type belonging to the summer-flowering class is now popular and some good varieties are available; **Roselight**—a rose pink, **Rose Charm**—a deep rose and rather late, and **Dark Blue.** Giant Perfection strain is valued for its summer and winter-flowering habit and contains such varieties as **Sapphire**—a rich deep violet, **Heatham Beauty**—golden rose, **Rose**—pink, **Blood Red**—a deep red, **Fiery Scarlet**—brilliant red, and **May Queen**—pale blue. This Giant Perfection strain grows to a height of about 2 ft. and the plants have a good branching habit and produce large flowers on long stems. There is usually a high percentage of double flowers.

Stocks like an open, sunny position and not too much water. The percentage of double flowers depends to a large extent on the strain and the careful selection of the seed parents. Double-flowering stocks do not produce seed

and as they have no pollen, have no influence on the percentage of double flowers obtained from the seed of single flowers. Some single-flowered plants produce seed which gives rise to only single-flowered plants, but other single-flowered plants produce seed which gives both singles and doubles. Careful selection of the single-flowered plants for seed purposes will result in a higher percentage of double-flowered plants. It has been noticed that strong seedlings and old seed usually produce more double-flowered plants.

Seed may be sown in boxes or in seed beds, but care should be taken to ensure that the young seedlings do not become checked in their growth. To control aphids, spray with nicotine sulphate, 1 dessertspoonful to a gallon of water. Add a small amount of soft soap to increase the wetting properties of this spray. If the leaves are showing signs of being eaten by grubs, apply a spray of arsenate of lead (paste) 1 oz. per gallon.

Violets

Violets like a cool moist soil which is not too rich. Too much nitrogenous manure promotes excessive leafy growth at the expense of the flowers. For the best results they should be replanted every second year. Violets may be propagated by seed, runners or division of the old crowns. When dividing the crowns, select the younger portions for replanting and discard the old woody crown. Division and replanting should be done as soon as flowering has finished. Plant a double row with 12 inches between plants and the rows 12 inches apart. The best single violets are **Princess of Wales** which has long stalks and large violet flowers with a sweet perfume, and **Mrs. D. Lloyd George,** a deep violet-blue with a white and red eye and long stems. **Neopolitan** and **Marie Louise** are double violet-coloured forms and **Compte de Brazza** is a double white variety.

THE VEGETABLE GARDEN

Beans

Late this month, in warm situations, the first sowing of French Beans may be made. **Canadian Wonder, Brown Beauty, Negro Long Pod** and **Emperor William** are popular varieties. In cooler districts, better results are obtained by delaying the sowing of beans until October. Sow in rows about 2 ft. apart, 4 to 5 inches between the plants and cover to a depth of 1 to 2 inches. **Startler Wax** is one of the best varieties of butter beans and also can be sown this month. Postpone the planting of runner beans until late October because these usually set better in the late summer and autumn. Before planting, dig the beds deeply and add about 2 to 3 oz. market garden manure per square yard. In poor soils, this application can be increased to 4 to 5 oz. per square yard.

Cabbages

Seed of **St. John's Day** cabbage may be sown now in a seed bed. The plants will be ready for transplanting in late November and early December. After sowing, gently press the seed into the soil before covering it. Cabbage seed requires only about $\frac{1}{4}$ to $\frac{1}{2}$ inch of soil above it.

Peas

Another monthly sowing of peas should be made to provide a succession of this nutritious vegetable. **Melbourne Market, Greenfeast** and **Richard Seddon** varieties may be sown now. Rows should be spaced about 18 inches apart and plants 2 to 3 inches apart. Cover the seed to a depth of 1 to 2 inches.

Spinach

Summer spinach can be sown this month if the soil is rich and not too acid. This is a difficult crop to grow unless the conditions are favourable. It is the round-seeded form of spinach that is usually sown now. The prickly-seeded kind is sown in late summer and autumn. Sow the seed in drills 12 to 14 inches apart and thin out to about 4 to 6 inches between the plants. The thinnings can be used as greens. Many home gardeners make several thinnings at fortnightly intervals and use the plants removed. Spinach should be grown quickly and applications of nitrogenous manure will be found useful in growing this vegetable. Blood manure or blood and bone manure can be used at the rate of 3 to 4 oz. per square yard. If available, nitrate of soda at the rate of 1 oz. per square yard will stimulate growth and ensure a good green colour.

Weeds

At this time of the year weeds become very troublesome. The best method of control is to prevent the establishment of the young weed plant as soon as the seed has germinated by regular cultivation of the surface soil with the hoe. A very useful implement for this purpose is the 3-pronged weeder. A large area can be cultivated in a short time with this implement.

Growing Field

By C. E. COLE, B.Agr.Sc., Hortic
Officer, and FRANK M. READ,

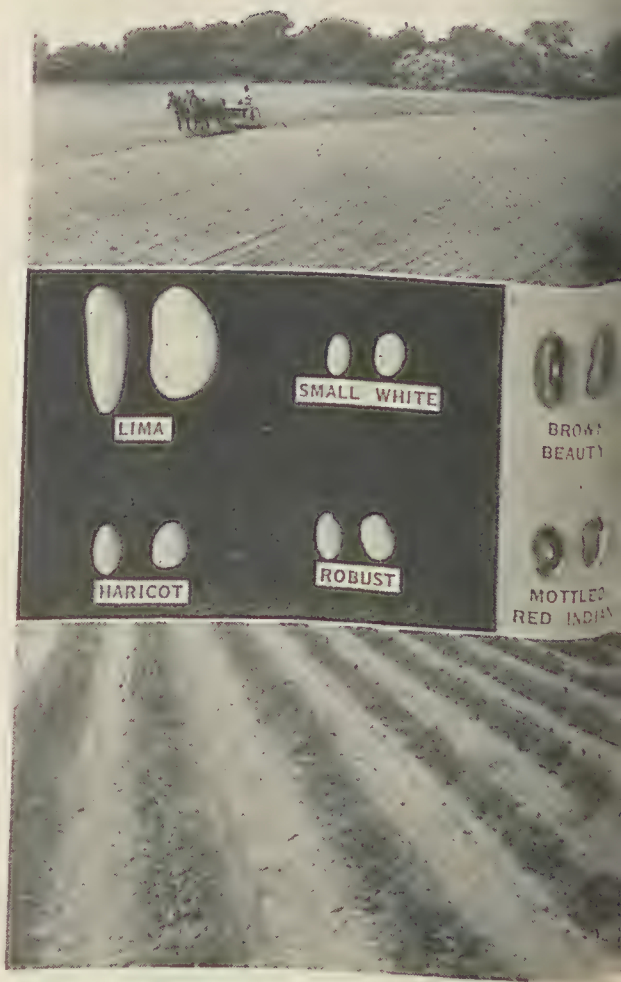
FIELD beans, sometimes called dry-shell beans, are those kinds in which the dried mature seed is used for human consumption, mostly in the canned form. In Victorian agriculture they are represented chiefly by the small, white-seeded types often referred to as Navy beans, but include also the haricot, lima, and many less familiar coloured types.

The demand for the small white type of field bean has increased greatly in recent years, largely because of defence food requirements. To meet this demand it became necessary to produce large quantities in Australia. The crop has now become established in Victoria as a profitable enterprise.

Beans have a food value approximately equal to meat, and are particularly suitable for people leading an active life.

Field beans are not difficult to grow under suitable conditions, but considerable care is needed to maintain the quality of the bean sample at a high level. Most of the cultural operations are influenced by this necessity.

If they are to realize a profitable price and have ready sale the beans must have good natural colour and be free from damage. The grade standards and prices for Navy beans, for instance, grown under contract to the Government are as set out in the appendix to this article. The value falls rapidly as the percentage of off-colour, stained or damaged beans increases.



Top Left—Sowing beans with a sugar-beet drill. Top Right
Centre Left—Varieties of field beans. Centre Ri
Lower Left—Bean crop prepared for furrow-irrigation.

Yields and Economics

The varieties used, and growing conditions also, will affect yields greatly. In the exceptionally unfavourable 1941–42 season, the main variety grown, "Small White", yielded from ten to fifty bushels per acre where the crop was given reasonable attention. Yields of not less than thirty bushels per acre may be expected in the better districts, and between twenty and thirty bushels in most other districts.

Cost of production appears to be about £8 per acre where the beans are grown as a row crop. With costs at this level present prices offer prospects of good returns.

In addition, beans have a special place among farm crops because they are a soil building crop, improving fertility and friability, a benefit which cannot be measured readily in terms of money.

Where Beans can be Grown

Beans are subject to frost injury, and can be grown only where there is a frost-free summer period of four months or more. They should be planted on well fallowed land and receive a minimum of about an inch of rain per month for the first three months, or irrigation. There must be reasonable expectation of warm dry weather at the harvest period. Wet conditions at harvest time make successful harvesting difficult, and may result in stained beans. Strong winds and cold conditions check growth.

eans in Victoria

esearch Officer, G. N. HYAM, Seeds
C., Chief Inspector of Horticulture

rough preparation of seed bed will prevent weedy crops. A good sample, and a poor sample of "small white" beans. Right—Adequate shelter improves the growth of beans.

Soils should be friable and well drained, and reasonably fertile. Beans do best on warm, sandy loams.

Generally, beans can be grown where, for instance, maize, green (French) beans, potatoes, tomatoes or pumpkins succeed. Good crops have been grown at Alexandra, Bairnsdale, Koo-wee-rup, Leongatha, Lindenow, Orbost, Murrabit, Nyah, and several other districts of similar types.

SOWING AND CULTIVATION

Preparing the Seed Bed

Beans respond to good soil preparation. The main aims should be, firstly, to obtain a well worked seed bed fine and mellow in the surface two or three inches but firm and moist beneath, and, secondly, to germinate and, by cultivation, to destroy as many weed seeds as possible before planting the beans. Autumn plowing is strongly recommended, but spring plowing at least a month before planting is satisfactory, provided the ground is free of weed seeds.

Early in the spring the ploughed land should be disc-cultivated, and a loose surface mulch maintained until planting time to destroy weeds. Every effort should be made to destroy or remove the runners of couch grass, which has the worst effect on beans of any weed. The land should be rolled and harrowed just before planting.

Time to Sow

Four considerations should be kept in mind in deciding the best sowing date. Firstly, it is not sound practice to sow before the danger of frosts has practically passed and in any case, in cold weather the beans make little headway. Secondly, there must be sufficient warmth and moisture for germination. Thirdly, it is not desirable for flowering, which may be expected eight to nine weeks after sowing, to occur in very hot weather for beans will not set satisfactorily in severe heat, the blossoms dropping off. Fourthly, for most satisfactory results, harvesting must come while the weather is still dry and hot and there is little danger of continued rains.

For most of Victoria late September to early October sowing will usually be found satisfactory. In some districts which regularly have frosts up to the end of October, planting would have to be deferred until then, while growers in the hotter northern irrigation districts, unless they can sow in September and so get the plants into bloom by November, would be advised to defer planting until, say, early January. Such late plantings, however, would give lighter crops and could be made only in districts where good harvesting weather up to the end of May can be expected.

Within the above limits sowings may take place over a few weeks to spread the work of sowing and harvesting.

Beans will not thrive where drainage is poor. Note the row in the depression.

Seed

The seed for bean crops should normally be specially selected, so that the variety will remain true to type and free from disease. It will retain germination capacity for at least three years. Older beans should be tested before use. Surface-stained beans of good type are suitable for seed, but internal staining is usually caused by mould which attacks the germ and reduces the percentage of germinable beans. Samples containing stained beans, therefore, should be tested before use. The Department of Agriculture will test seed samples for growers free of cost. As the germination drops below 90 per cent. so must the seeding rate be raised.

During the war years, it is obvious that our seed requirements should be met, as far as possible, from crops unsuitable for canning, and the pickling of such seed becomes an important matter. A recommended treatment is the mixing of a mercuric dust at the rate of two ounces per bushel with the seed.

Spacing

Field beans are usually grown as an inter-cultivated row crop. They can be grown, like peas, in 7-inch drills, but, since inter-cultivation is then impossible, the ground used must be quite free of seeds or runners of weeds likely to compete with the beans. Row spacing is usually between 18 and 36 inches, depending upon the freedom of the soil from weeds, the type of seeding and cultivating implements available, and the district rainfall. In districts of good summer rainfall, and on soil free of weed seeds, closer row spacing means increased yields, provided that cultivation and irrigation can be carried out efficiently. Typical row spacings are 18 and 36 inches where sugar beet drills and cultivators are available, 21 or 28 inches where grain drills are used, and 30 to 36 inches where maize machinery is used.

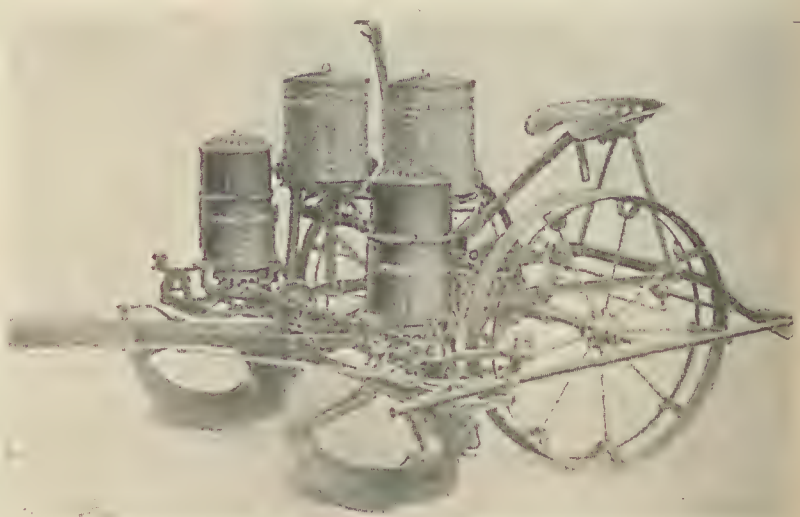
In the row, seeds should be spaced about 3 inches apart. Experiments in Victoria have shown that the yield falls considerably when seed spacing in 30-inch rows is more than 4 inches. Beans should be sown about 2 inches deep, more in light soils and less in heavy soils.

Sowing in 7-inch drills has not been sufficiently tried out in Victoria yet to enable its value to be accurately assessed, and new areas are being opened up which differ from those on which field beans have always previously been grown. The main inducement to sow in 7-inch drills appears to be the greater likelihood of successful direct harvesting of the crop by suitable machinery.

Seeding Implements

Most seeding implements will plant beans satisfactorily. Small areas may be planted by hand, or with hand drills of the "Planet Junior" type. The maize planter has been widely used for larger areas.

The best seed plate for small white beans has been a $\frac{1}{8}$-inch thick plate, each hole being $\frac{5}{16}$-inch long and $\frac{1}{4}$-inch deep. A 32-hole plate and a



The two-row maize planter sows beans well. The fertilizer attachment places the manures to best advantage.

medium gearing has been found approximately correct for the popular types of two-row maize planters so far examined.

The ordinary grain drill sows beans successfully. The cup-type feed is preferable, and most of the feed-holes must be stopped up to give the desired row spacing. For instance, by stopping up all the holes except the second, sixth, and tenth holes of an 11-row 7-inch drill, a 28-inch row spacing will be obtained. The rate of feed must be set very low. The 4-row 18-inch sugar-beet drill is also quite satisfactory. Two of the hoes may be blocked to give a 36-inch row spacing, or one centre hoe may be removed and the other offset to give a 27-inch row spacing. (The rate of feed must be set high.)

Rate of Planting

The amount of seed required per acre depends upon spacing, size of seed and germination capacity. Table I. shows suitable seeding rates for beans of different sizes and for different row spacings. The table refers to beans the germination of which is high—not less than 90 per cent.

Beans like "Small White", sometimes called in Victoria "Californian Navy Bean", average about 3,000 seeds per lb., the larger white beans of the "Robust" type, sometimes called in Victoria "Canadian Navy Beans", average about 2,000 and others like "Brown Beauty" average about 1,000. If the germination is less than 90 per cent., the seeding rate must be raised—e.g., seed of 75 per cent. germination should be sown about one-quarter more heavily than the rates shown in Table I.

Manuring

Under war-time conditions, a maximum dressing of 2 cwt. of superphosphate is recommended if artificial fertilizers are used. If the fertilizer be allowed to come in contact with the seed, it may reduce germination considerably. It is best placed in one or two bands an inch or two away from the seed and slightly below it. This ideal can be approached by the maize planter with fertilizer attachment, or by feeding the fertilizer through the two hoes on either side of each seed hoe when a grain drill is used. These hoes may, with advantage, be inclined toward the seed hoe so that the fertilizer is placed, say 3 to 4 in. on either side. When other machines are used for seeding, the fertilizer may be broadcast or drilled in separately before planting, or spread in a shallow drill alongside the seed row.

Protection

The whole bean field must be well fenced to protect it from animals. Rabbits are particularly fond of bean plants and have ruined many a good crop. Cold winds and hot north winds also are serious enemies of the bean plant; therefore, exposed fields should, if possible, be avoided. The rows are best sown in the direction of the prevailing winds, and even when the site is not very exposed to wind it will be found that narrow strips of maize, sunflowers, barley, or rye about half a chain apart will shelter and improve the crop. Closer planting of the rows will also assist in protecting the plants against wind.

Cultivation

Cultivation, which aims chiefly at the destruction of weeds, is performed more easily and cheaply before the beans are sown, and it pays to make a good job of it then. If rain falls after planting, but before the plants are up the field should be *lightly* harrowed. This destroys remaining small weeds and breaks any crust which may tend to prevent the delicate young plants emerging. If weed seeds germinate with the beans, the ground can be harrowed after the plants are up. This will cause no important damage to the beans provided the harrows are light, the soil is not cloddy, and a warm, dry day, when the young plants are not wet and brittle, is chosen for the work.

TABLE I.—SEEDING RATES FOR FIELD BEANS.

(Lb. of Seed per Acre.)

Approximate Number of Beans per lb.	Spacing of Rows and of Plants in the Row.					
	7 in. x 6 in.	18 in. x 3 in.	21 in. x 3 in.	28 in. x 3 in.	30 in. x 3 in.	36 in. x 3 in.
3,000	50	40	35	25	23	20
2,000	75	60	50	37	35	30
1,000	150	120	100	75	70	60

Spraying is a suitable irrigation method for beans.

The next cultivation, between the rows and usually three or four weeks later, may be 3 to 4 ins. deep in the centre, but fairly shallow near the plants, and should go as close to the plants as possible without damaging them, to reduce hoeing and hand weeding. Further cultivation should not be necessary until just before the plants flower unless heavy rain falls and weeds appear. It should be very shallow so that the roots will not be damaged. Cultivation should be level, except for furrow irrigation and should not be done while the plants are wet or in flower. It should cease, for preference, before flowering, because later cultivation tends to keep the plants growing instead of ripening their crop early and evenly.

Weeds in the bean rows must be removed with the hand hoe or by hand pulling. They should not be allowed to grow large before pulling or the bean roots may be extensively damaged by their removal.

Irrigation

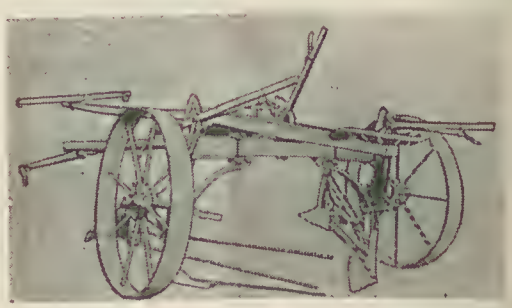
Where irrigation is used in a rowed crop furrow or spray irrigation is preferable to flood irrigation. Field beans are easily injured by an excess of water, and extremely careful grading is necessary if the field flooding method is to be used. Irrigations should be quick and light and followed by cultivation if weeds show up. The first application of water may be delayed until the leaves begin to take on a darker green colour indicating failing soil moisture, but an irrigation should certainly be given about a week before the plants blossom, that is about two months after sowing. This will give the plants the best chance of setting a good crop, which they will not do under dry, very hot conditions.

Water should not be applied after the pods have set unless the soil becomes very dry, and not at all after the pods have begun to enlarge rapidly. Late irrigation delays maturity of the main crop and may throw the plants into second growth on which a second crop will be carried. This would be an advantage only if harvesting could be delayed until the second crop is ripe. To aim at such a result would not be sound practice, and it is recommended that all steps be taken to improve the setting of the main crop and its steady growth until the pods are full size and its subsequent ripening off for harvesting as soon as possible.

HARVESTING AND THRESHING

Up to the present it has been necessary to pull or skim out or mow the plants before threshing. The plants are then cured in the field for a short time before threshing, which may be performed by one of the following alternative methods. They may be carted in, stacked, and threshed when convenient, or, alternatively, after curing may be threshed in the field by feeding into a stationary thresher or header or by picking up from the ground with a power-driven header harvester fitted with a pick-up attachment. Use of the combined mowing and lifting attachment for headers such as the "pea front", for the harvesting of the standing crop has not, so far, proved satisfactory.

In every harvesting operation care should be taken to keep the beans free of soil. Dirt will discolour the seed and reduce its market grade, and pellets of soil, the same size as the seed, cannot be removed easily by machine, but must be removed by costly hand-picking.



Double-row bean cutter.
[After *U.S.D.A. Bul.* 1509.

When to Harvest

The correct time to pull or cut the plants depends to some extent on the method of threshing to be used, but harvesting too early means too high a percentage of immature beans, while harvesting too late means that many pods will shatter during handling. If the beans are to be stacked before threshing, they will have more opportunity to ripen and harden any slightly green pods, and usually would be pulled or cut a little earlier than for field threshing, that is at about the time when all or most of the pods have turned yellow, and a few of them have dried out and become brittle. The plants can be carted and stacked with less danger of shattering at this stage.

If the beans are to be threshed in the field, they will have less chance to ripen after harvesting, and therefore must be left standing for a week or so longer, until about half the pods have dried out.

Experience has shown that it is better to sacrifice a few green beans for the sake of getting the main crop in a few days earlier, particularly when the harvest approaches the break of the season. Nevertheless, if continued wet weather is experienced, the beans will remain unstained longer when left standing than when lying on the ground. Under such conditions, it is best to harvest small areas at a time, and to put each lot into a stack as soon as it is dry enough.

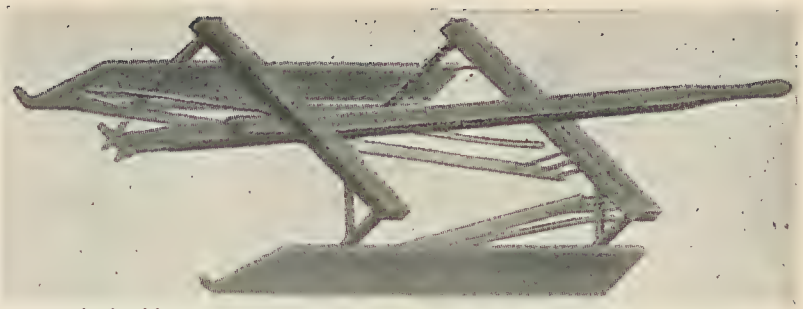
If pods begin to shatter during handling, the work should be done only in the mornings and evenings when the pods are moister and less brittle.

How to Harvest

Small areas are best pulled by hand, or cut just below the soil surface with a sharp shovel. Half to one acre per man per day can be handled thus. Larger areas also can be pulled, but the work is slow with the present labour shortage. In very weedy crops, however, hand pulling is the only satisfactory way of harvesting.

Many improvised horse implements can be used in clean crops to cut the plants far more cheaply than by hand. The onion skimmer is quite satsifactory provided the knife is kept sharp.

Long cutting blades can be attached to various standard types of maize cultivators to make an implement something like that shown in the accompanying illustration. A special sled bean cutter, as illustrated, can be made fairly cheaply. Such implements cut two rows of beans at once, and cause a minimum of shattering.



A double-row sled bean cutter, used extensively in American bean-growing areas.

The ordinary mower is less successful because it cuts too many of the low hanging pods, and this is accentuated where the land has been ridged by inter-row cultivation.

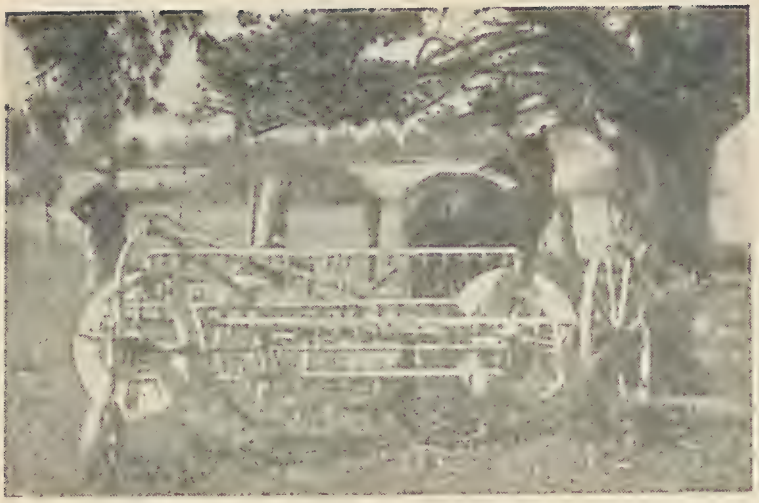
If the horses are likely to trample on the first round cut while cutting the second round, the first round should be moved away, either by a tedding device, a side-delivery rake or a pitchfork, so that ripe pods will not be shattered by the horses' hoofs.

Although there is a widespread desire to harvest direct by the use of suitably modified header harvesters to overcome labour shortage and enable larger areas to be sown on individual farms, it should not be overlooked that where labour is available it is quite economic to pull the rowed crop by hand, as the cost of this operation may easily be balanced by the reduced loss of beans by shattering during harvesting.

Curing

After the plants have been pulled or cut, they should be thrown into windrows consisting of about six bean rows, or into small flat cocks and to allow to lie in the field for a few days. If the plants are to be carted in and threshed from a stack or barn, the stems and leaves at carting should be yellow but not necessarily brittle-dry. For field threshing the plants should be practically dry.

Windrows are particularly suitable when the header with pick-up attachment is used. If the plants are in single rows in hot weather, they may dry out too quickly and make the beans liable to excessive cracking and splitting during threshing. Single rows, too, will take much longer to pick up.



The side-delivery rake is useful for windrowing beans for curing.

If rain wets the windrows or cocks, they must be turned over as soon as the tops are dry to prevent staining beneath. If continuous wet weather should be experienced at harvest, the ground may become so wet that turning the crop becomes ineffective and even undesirable, as good dry beans on top would then be turned underneath to stain from contact with the wet soil. Under such bad harvesting conditions it may be better to sacrifice the lower layers.

Carting and Stacking

When a threshing machine is not immediately available, the beans must be carted in and stacked until they can be threshed. They will stand a certain amount of wetting in the field provided they are turned each time, but, if there is likely to be delay in threshing, it is a good insurance against rain damage to stack the beans. Stacking also has the advantage that the beans sweat a little in the stack, and the seeds become toughened and less likely to split during threshing.

Vehicles used for carting beans should be lined with some kind of tarpaulin to catch any seed which shells out during loading and unloading. Likewise, the stack should be built on a layer of straw which can be put through the thresher to recover shelled seed. This straw also will serve to keep the bottom beans dry.

The best place to stack beans is in a well-ventilated barn. The next best place is in a maize crib.

Stacks in the open should be built north and south on a timber base on a well-drained site; they should be kept high in the centre and well covered with thatch or canvas. If the beans are damp, the stacks must be small and narrow, and may have posts or poles through them at intervals to improve air circulation for drying. If they begin to heat up, they must be spread out immediately to dry. A good open hay shed or barn is a valuable insurance against rain damage. An excellent design has a roof with overhanging eaves about 25 feet from ground level and three floors 8 feet apart constructed of 3-in. x 1-in. boards set about 3 inches apart.

Threshing

In dry weather, the seed can be threshed out of the pods very easily, but the seed of most varieties may split readily in the process. The more primitive methods of flailing and rolling cause little splitting, but special precautions must be taken with threshing machines to avoid considerable losses.

Small quantities of beans can be threshed out quite well with flails or by driving with horses and a light roller over a layer about 2 ft. deep on a hessian or canvas sheet. The vines are thrown off the threshing floor or sheet with a pitchfork, and the beans and small trash gathered up for winnowing. Winnowing may be done with the aid of the wind or with a small winnower.

Special "bean hullers" are used in America, but most kinds of threshing machines can be adapted to thresh beans. The pea thresher is perhaps the most suitable machine available in Victoria, and good results have been obtained with the header harvester, both as a stationary thresher and as a pick-up machine.

Three precautions which must be taken with all machines are set out hereunder:—

(1) The drum speed must be low. Measured as the speed of the outside of the revolving cylinder, it should range from 800 feet per minute for very dry beans to 1,200 feet per minute for moist beans. This speed may be calculated as follows:—

Revolutions per minute × diameter of drum (feet) × $3\frac{1}{7}$ = speed of outside of cylinder.

For a 20-in. drum these speeds are equivalent to about 150 to 230 R.P.M.

It is important in all threshing machines that the rest of the mechanism should not be slowed down in reducing the speed of the drum. If this is done, the separation of the seed from the trash will not be complete, and choking of the riddles may occur.

With the header most commonly used for the threshing of the bean crops to date, it is not possible to reduce the drum speed without reducing the blast to such an extent that the machine ceases to separate efficiently. For this reason splitting of dry beans during threshing has been a serious problem. In an effort to overcome this difficulty, rubber-covered drum bars have been made, but it would seem that a sounder procedure would be to provide some means of maintaining the blast when the drum speed is low.

(2) In bar-drum machines, a smooth "pea" concave must be used under normal dry conditions. Under moist conditions, the wheat concave may be necessary to thresh the beans completely. Clearance between drum and concave should be wider than for wheat and watched carefully.

In peg-drum machines, all but one row of the concave teeth and half of the drum teeth are removed, leaving a side clearance of at least $\frac{3}{4}$ inch between drum teeth and concave teeth.

(3) Beans from return chutes should not be allowed to pass through the drum a second time.

Suitable screens (riddles) must be used to produce a good sample. Some threshers produce a sample which must be winnowed again if dockage for trash is to be avoided.

Threshing with the Header Harvester

Most Victorian beans will probably be threshed with the header harvester most commonly used for wheat. Drum, drum speed, return chutes, and riddles must be modified as just described.

The machine must be power-driven, either from a tractor or by a separate engine mounted on it so that the threshing mechanism will work at the same speed whether the machine is stationary or in motion. Wheel-driven harvesters cannot be used efficiently.

For hand feeding, the whole front of the machine, comprising comb, knife, spirals and elevator, is removed, and a small feeding table built in front of the drum. Altered thus, the machine may be used for stationary threshing at the stack or from the wagon, or hauled about the field as the beans are fed in from cock or windrow.

For pick-up harvesting, the grain front is replaced with a "pea pick-up," a device with revolving fingers which lift the loose plants into the spirals of the machine. The machine is pulled along over the windrows of beans, which it picks up and threshes. An 8 or 10 ft. cut header with a "pick-up" about 6 feet wide will handle, at normal speed without difficulty, a windrow of six bean rows thrown together. In this way about 15 acres of a normal crop may be picked up and threshed in a day. Contractors charge for this service from about 25s. up to 35s. per acre for small areas or those not readily accessible. For large areas this is undoubtedly the most economical way of harvesting beans. A "pick-up" attachment costs approximately £60.

Direct Harvesting with the "Pea Front"

The "pea front" attachment for the header harvester includes a mower knife which can be set much closer to the ground than the

Beans can be threshed with a roller in dry weather.

The header-harvester fitted with a pick-up attachment allows rapid and efficient handling of the bean crop.

usual grain front knife. Attempts have been made to use it to harvest the standing crop of beans and so avoid the preliminary pulling or cutting of the plants. So far they have not been successful. Like the mower, the pea front cuts many low-hanging pods and loses these beans. If set at its lowest level, it picks up a good deal of soil, much of which reaches the bag and spoils the sample. It yet remains to be seen whether such direct harvesting can be perfected. It appears possible on perfectly level land on which the beans have been planted closely and so made to grow more upright and carry their pods higher.

Bagging and Storage

Bean seed in Victoria is usually put in the standard three-bushel corn sack. As with wheat, such bags hold 180 to 190 lb. of seed. Double bags are unnecessary. In peace time new bags would be insisted on, but if used bags are utilized during the war period they must be clean, sound and free from weevils. Manure bags, of course, are prohibited. Used potato and flour bags are unsuitable because the dust and dirt or flour greatly lower the value of the beans.

Moist beans—beans which have a higher moisture content than 18 per cent. and will not "rattle" when shaken together or which can be easily indented by the thumb nail—should be watched carefully for heating if bagged. They should not be sewn up until sufficiently dry, and the bags should be loosely stacked in a single layer with ample ventilation.

Bags should on no account be left uncovered in the fields overnight or stacked on a damp floor.

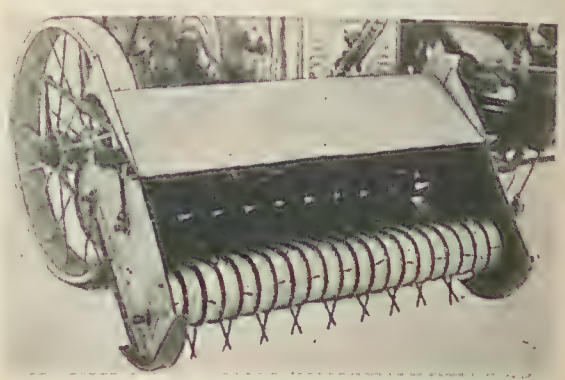
Should the slightest sign of heating occur the beans must be spread out on a clean surface in a thin layer not more than about two inches deep in an airy shed, or in the open if the weather is warm until they become hard and dry. During drying they should be stirred frequently by turning with a shovel or raking. Bags of beans wetted by accident should be treated in the same way.

Beans have been dried in kilns and dehydrators in Melbourne to a limited extent. The cost of kiln drying commercially should not exceed 1s. per bushel, and of dehydration, say, 3s. 6d. to 4s. per bushel. Such drying is the only certain method of saving moist beans in cool, damp weather.

Pending removal from the farm, bags of beans should be stacked on a dry floor in a weatherproof but well-ventilated shed. The stacks should be open, and tiers should be separated by dunnage to allow free circulation of air. Mice and rats do not appear to attack beans to any great extent in normal seasons.

MARKETING THE CROP

Beans are usually sold by the farmer in the condition in which they leave the thresher, and the final preparation for sale to the public is given in seed-cleaning establishments. The sample should, however, be well winnowed, and screened free of coarse trash and shrivelled seed. Impurities reduce the value considerably, and may even prevent sale. Hand picking at home to remove stained beans from large quantities of beans is not generally economic. Grading for size is not necessary, except to eliminate shrivelled seed and strange varieties.



The pick-up attachment for the header-harvester.

Assessment

A sample of about 2 lb. is taken with a seed trier by the assessor from a definite proportion of the bags in the consignment. All or a part of this sample is separated into good beans and damaged beans, stained beans, and impurities, and the proportions determined by weight. The consignment is valued according to these proportions, the price being reduced in accordance with the proportion of unusable material contained plus the cost of removing it; and also in accordance with the brightness of the good beans. The appendix shows details for "Navy" beans fixed August, 1942.

If beans are slightly off-colour, but not sufficiently so to prevent them being canned satisfactorily, or if they are soiled, a deduction of 2s. 6d. per bushel in the price paid will be made.

Treatment by the Seed Cleaner

After leaving the farmer, the beans are passed through one or more machines to remove as much as possible of the impurities and to polish up the beans. They are then passed over sorting tables, where the remaining stained and damaged beans, pellets of earth and other foreign objects not removed by the machines are picked out by hand. This hand picking is a very slow and costly operation, particularly for the small-seeded kinds of beans, and is largely responsible for the rapid drop in price for impure samples. To some extent machines of the "Kipp-Kelley" type recently imported into Australia will reduce the work of eliminating faulty beans, but it would seem that we must rely on hand picking to glean the maximum percentage of canning-quality beans from the crop.

Pests and Diseases

The insect which has caused the most widespread damage to beans in Victoria is the small, grey-blue bean butterfly. The small green grub chews a round hole in the green pod and eats part of the seed, rendering it unsuitable for canning. The damage, although present in almost every crop, is not sufficiently serious to warrant control measures.

Small infestations of aphis may occur when the plants are young. They can be controlled by dusting with nicotine dusts.

Red spider also may attack the crop, causing a rapid silvering and wilting of the leaves. They can be controlled by dusting with a mixture of equal parts of slaked lime and sulphur.

Cutworms can be controlled with poison baits.

Various virus diseases, principally mosaic diseases causing variegation of the leaves, distortion and stunting, occur in Victoria. Halo blight and probably bacterial wilt have been found. None of them have yet occurred in serious proportions, but their spread must be checked by rigorous seed selection and rotation of crops.

Root rots attack beans readily under wet-soil conditions, particularly if cultivation or weeding injures the roots extensively.

Appendix

Grade descriptions and prices for Government contract buying are :—

A1 Grade (25s. per bushel.)	.. Not less than 98 per cent. by weight of the contents of each bag shall consist of Navy beans which shall be uncracked and otherwise undamaged and well-nigh white.
No. 1 Grade (22s. 6d. per bushel.)	.. Not less than 95 per cent. weight of the contents of each bag shall consist of Navy beans which shall be uncracked and otherwise undamaged and well-nigh white.
No. 2 Grade (20s. per bushel.)	.. Not less than 91 per cent. by weight of the contents of each bag shall consist of Navy beans which shall be uncracked and otherwise undamaged and well-nigh white.
No. 3 Grade (17s. 6d. per bushel.)	.. Not less than 88 per cent. by weight of the contents of each bag shall consist of Navy beans which shall be uncracked and otherwise undamaged and well-nigh white.
No. 4 Grade (15s. per bushel.)	.. Not less than 85 per cent. by weight of the contents of each bag shall consist of Navy beans which shall be uncracked and otherwise undamaged and well-nigh white.

AUSTERITY NOW MEANS PROSPERITY LATER

INVEST IN THE AUSTERITY LOAN

Mr. R. M. Chirnside's senr. 4-yr.-old "Mornmoot Mimi" (660 lb. butterfat).

A Year of Many Records

During the past year no fewer than a dozen production records were made. They include the "all-time" highest individual, twice a day, butterfat record of 934 lb. made by "Banyule Tiddlewinks 26th," while "Inverurie Blue Bell's" yield of 826 lb. butterfat is an Ayrshire State record for any age. The leader in the senior four, junior four, junior three, and senior two-year-old classes were records for these ages. "Finchley Bluebell's Duchess" (802 lb. as a junior three-year-old) and "Yarraview Rougette's" (731 lb. butterfat as a senior two-year-old) also are Australian records for their ages.

The three junior two-year-olds that exceeded 500 lb. butterfat equalled the record for the number to exceed this level at that age.

The number of cows to exceed 700 lb. butterfat and 800 lb. butterfat also constitute records; while the 533 lb. butterfat for 27 cows brings the "Finchley" Stud a record for a herd of this size. Actually, the figures of the "Yarraview" and "Windrest" herds also surpassed the previous butterfat level for herds of twenty or more cows. The highest butterfat for a herd of less than twenty cows is still held by the "Mornmoot" Stud with seventeen cows, 599 lb. actual butterfat. An interesting comparison is that 42 cows in the herd of Mr. P. B. Gaines, of America, produced 9,659 lb. milk and 500·6 lb. butterfat on twice a day milking.

There comes a year in the experience of most testing breeders when everything favours high production. In such cases the herd generally has enjoyed sufficient pre-calving rest, and has received sufficient suitable feeding to permit recalving in excellent condition. Further helpful factors would be that the majority, or all of the herd, calved to suit the longest period of green growth for the area in which it is located, while the herd has been singularly free from after-calving trouble and/or herd disorders.

Given all these hopeful factors, high yields are still unlikely should a long period of dryness occur. If, on the other hand, a mild winter and early spring is followed by many rainy days in late spring and early summer—such as were generally experienced in southern Victoria last year—only efficient cows and expert management are needed to obtain excellent yields. It is under such conditions that a peak year of production may be expected. At "Finchley," for instance, the late snow water floods which frequently cover the flats for many weeks—thereby souring the pasturage—quickly rose and subsided again, resulting in an effect much like a good soaking from irrigation. In these circumstances, excellent feeding was obtained from the flats prior to the herd going on to irrigated areas as the season advanced.

Cow yields may be adversely affected by dogging and rough handling in transit from the field to the shed, and also by boss cows horning timid and junior stock. A very serious loss of yield—as high as 50 per cent.—may result from cows calving out of season, thereby missing the flush of spring growth, while the lack of shelter from the heat or cold, or even a poor water service, may well debar a cow from fully expressing her dairy ability. When these factors are considered, in conjunction with the knowledge that preciseness is never achieved under any system of herd testing, more appreciation will be given to the cow with several good records, and the sire which has many good producing daughters. It is because more attention is being given to these things that Sire Indices and Advanced Register tables are receiving more and more attention by breeders and farmers throughout the dairying countries of the world.

Research suggests that when a cow has less than 40 days precalving rest, the ensuing lactation may be adversely affected. The fewer the days of actual cessation of milk secretion, the greater this effect may be. Mature cows that "calve in milk," i.e., not having gone dry, may be adversely affected to the extent of 15 per cent., while "second calver" yields may be decreased by as much as 25 per cent.

When cows become pregnant within a fortnight of calving, their yields may be lowered by as much as 33 per cent. On the other hand, if the service period be extended, a favourable result may be anticipated. In a 273-day test period the increase was found to be nearly 25 per cent., and up to 30 per cent. with a cow out of calf for a year. "Linga Longa Wattle Speck," the champion "long distance" test cow of Victoria, when non-pregnant, and on her fourteenth lactation, produced nearly 30 per cent. higher than the average of her preceding four years.

Some authorities affirm that "the bigger the cow the greater the potential production," while others contend that "within the breed the big cows win out in high yields and profit over cost."

Professor A. D. Buchanan Smith (Scotland) says "some correlation was found between measurable points of a dairy cow, as to form and function—but usually so little as to be useless. Size, measured by weight, was the only definite thing." While it may be true, in the main, that big yielders are big cows, there have been some very noteworthy exceptions.

In order to give some point to this discussion, the cows referred to in this report as having produced over 800 lb. butterfat were carefully measured with a steel tape. The results are given below, together with those of an early group of American Dutch Fresians, 80 per cent. of which were over three years of age. The figure of "Lady Silken Glow," an early 1,000 butterfat Jersey, is also given. The estimated live-weight in each case is taken from a Table, worked out by research workers in the United States, for cows with a specified heart girth.

It is noteworthy that all four cows to exceed 800 lb. butterfat in the year just concluded possessed three important features of a high yielder, namely, *a high maximum effort,* as

Comparative Body Measurements in Inches.

—	Breed.	Estimated Live Weight.	Heart Girth.	Navel Girth.	Poll to Tail Set.	Point Hip to Shoulder.	Length of Rump.	Width of—		Height at Withers.
								Hips.	Pins.	
Averages of 198 Dutch Friesians ..	—	1,200	77	..	..	..	..	22½	..	54
"Lady Silken Glow"	Jersey ..	1,200	76	95	79	43½	23	22½	13½	..
"B. Tiddlewinks 26th"	,, ..	1,100	73	96½	74	43	20½	21½	12	50½
"I. Blue Bell"	Ayrshire	950	69	93	77	44	19½	22½	11½	49
"Y. Le Mode"	Guernsey	1,197	75	92	82	45	22	23½	12	53
"F. Bluebell's Duchess"	Jersey ..	967	69½	95	73	43	18½	21½	12	48

Informative Data of the Over 800 lb. Butterfat Cows in Comparison with the American Jersey Cow, "Lady Silken Glow" (Over 1,000 lb. Butterfat).

Name of Cow.	Breed.	Age at Commencement of Test.			Highest Official Daily Milk Weight.	Total Yield in Lbs.			Last Day's Official Milk Weight.
		Year.	Month.	Days.		Milk.	Average per cent.	Butterfat.	
"Lady Silken Glow" ..	Jersey ..	5	..	..	..	14,939	6·91	1,035	..
Banyule Tiddlewinks 26th"	,, ..	4	5	26	64½	15,096	6·2	935	41½
Inverurie Blue Bell" ..	Ayrshire	4	11	10	81½*	18,116	4·56	826	43½
Yarraview Le Mode" ..	Guernsey	5	1	23	49½	11,840	6·89	815	35½
Finchley Bluebell's Duchess	Jersey ..	3	2	26	55½	13,449	5·96	802	50

* Milked thrice a day (73 lb. on twice a day milking).

seen in their highest daily milk yield. *Persistency of yields,* as seen in their ability to retain a high flow of milk for the major portion of their lactation as expressed in the high last-day's-milk yield, which indicates that a considerable amount of the year's effort is unrecorded.

In an English investigation, the "high yielders" exceeded the "low yielders" by 66 per cent., despite the fact that only 33 per cent. separated the groups when the highest daily average yields were compared. No less than 15 per cent. of the high producer's yield was made after the "low yielders" were dry. A definite weakness of the Australian system of herd testing is the failure to record the whole of the year's production; and the failure of breeders and farmers alike to appreciate the last day's milk weight; for therein is expressed the all important dairy character of persistent yield.

Cows possessing one or two of these characters in a marked degree—but not all three—have been tested by this Department. There have been instances of cows that exceeded 70 lb. milk daily, yet, because they lacked persistency, could only with difficulty be kept on the chart for the full test period, despite thrice-a-day milking. Other cows have made creditable yields, despite the low maximum effort. Some such cows have never reached 40 lb. of milk a day; yet they finished test with well over 20 lb. a day. When these cows possess a high butterfat percentage, yields exceeding 400 lb. butterfat are commonly made. "Inverurie Blue Bell" has persistency and high maximum effort in an unusual degree. "Banyule Tiddlewinks 26th" and "Yarraview Le Mode" possess the addition of high test, while "Finchley Bluebell's Duchess" has the character for persistency in an unusual degree. All four cows, however, possess each character far above the average, and their high records have resulted largely from this fact.

The Standard Herd Test Records for the quarter ended 30th June, 1942, will be included in the Standard Herd Test book to be published towards the end of September. Copies of this booklet may be obtained after 1st October from the Superintendent of Dairying, Department of Agriculture, Melbourne, C.2.

HERD AVERAGES, 1941-42

Owner.	Breed.	Junior 2-year-old.		Senior 2-year-old.		Junior 3-year-old.		Senior 3-year-old.		Junior 4-year-old.		Senior 4-year-old.		Mature.		Total Herd.	Average without Allowances.	Average with Allowances.
		No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.		
			lb.		lb.		lb.		lb.		lb.		lb.		lb.		lb.	lb
Herds of 25 Cows and Over.																		
1. Noble, T. M., and Sons	Jersey ..	4	430·8	1	514·0	7	547·6	..	..	5	596·0	1	744·5	9	512·3	27	533·5	589·9
2. Haywood, Dr. A. R.	„ ..	9	451·8	..	..	4	518·3	2	511·8	6	528·1	2	528·4	3	595·5	26	506·7	581·5
3. Read, Estate of the late J. D.	„ ..	10	351·9	5	337·8	4	421·0	3	419·3	4	472·4	1	468·0	8	490·5	35	412·3	490·3
4. Bennett, J. W.	„ ..	5	349·9	4	390·0	5	409·4	3	415·6	2	461·8	4	427·7	10	433·9	33	411·4	473·1
5. Hore, E. ..	„ ..	8	309·4	3	400·8	2	422·6	4	442·4	4	467·9	5	442·2	3	403·7	29	399·5	472·7
6. Devon Park Stud (G. S. Daley)	„ ..	10	333·2	1	425·7	4	334·6	3	423·6	7	428·4	1	522·1	6	442·8	32	392·0	466·1
7. Ballarat Orphanage	„ ..	10	337·2	2	425·2	..	..	1	465·3	1	447·4	5	471·1	24	414·2	43	405·3	456·5
8. McNabb, G. A., and Son	„ ..	17	306·1	7	380·2	3	379·5	6	345·2	4	406·5	6	386·0	26	404·7	69	370·1	449·6
9. Department of Agriculture	Red Poll	13	325·8	3	297·2	2	280·7	11	333·0	2	439·8	5	433·9	18	416·5	54	368·5	441·0
10. Atkinson, W. K.	Dairy Shorthorn	14	307·2	2	290·4	7	320·6	1	326·3	6	292·9	6	403·7	27	393·3	63	353·2	422·6
11. Walker, C. S. ..	Jersey ..	11	311·5	4	329·7	5	320·2	2	371·1	5	389·4	2	357·2	12	377·2	41	348·0	421·5
12. Lyon, W. H. ..	„ ..	5	301·3	2	235·3	5	325·1	5	329·7	5	358·9	4	439·1	9	404·0	35	355·2	416·1
13. Hurrey, Estate of the late W. H.	„ ..	2	252·2	2	310·0	5	327·5	2	373·3	3	362·5	1	405·8	12	385·3	27	356·5	403·2
14. McKenzie, Mrs. E. J., and Sons	„ ..	5	279·9	2	318·0	1	334·3	2	345·5	1	405·0	2	304·3	13	371·1	26	342·2	389·3
15. Smith Bros. ..	„ ..	10	224·5	4	285·7	1	343·4	2	329·3	5	303·1	3	361·7	19	360·9	44	314·7	376·0

Herd Averages, 1941–42—*continued*

Owner.	Breed.	Junior 2-year-old.		Senior 2-year-old.		Junior 3-year-old.		Senior 3-year-old.		Junior 4-year-old.		Senior 4-year-old.		Mature.		Total Herd.	Average without Allowances.	Average with Allowances.
		No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	Average.	No.	lb.	lb.
			lb.		lb.		lb.		lb.		lb.		lb.		lb.			
Herds of 15 to 24 Cows.																		
1. Banyule Pty. Ltd. (C. G. Lyon)	Jersey ..	4	386·8	3	447·5	3	432·8	1	523·9	4	632·8	..	..	..	..	15	482·9	565·5
2. Payne, A. E. T.	Guernsey	5	386·0	1	731·2	1	444·0	2	553·7	1	425·4	1	526·0	9	562·3	20	511·3	561·8
3. Chirnside, R. M.	Jersey ..	12	405·5	3	516·4	1	456·8	2	446·5	1	459·2	1	659·9	3	570·1	23	460·6	551·5
4. Maloney, P. J.	,, ..	5	365·2	4	411·7	5	500·4	1	486·2	2	414·8	3	590·3	2	476·7	22	455·2	531·4
5. Enders, N. H.	,, ..	7	381·9	3	440·9	..	..	1	530·9	1	502·0	1	546·5	2	525·8	15	441·8	525·8
6. Williams, Estate of the late F. A.	,, ..	2	379·0	3	335·6	2	464·9	1	516·6	..	..	2	523·3	6	540·9	16	468·9	519·4
7. Powell, T. S.	,, ..	8	354·4	3	393·3	1	547·7	..	..	1	518·1	1	486·8	4	514·4	18	423·6	502·9
8. Nancarrow Bros.	,, ..	3	273·0	5	401·2	..	..	4	441·3	..	..	2	541·2	3	474·7	17	417·4	485·5
9. Waterhouse, H. W., and Son	,, ..	4	318·1	4	378·2	4	399·2	2	419·0	..	..	2	468·4	8	455·2	24	408·3	469·4
10. Clarke, F. W.	,, ..	5	344·7	4	374·1	2	391·5	2	360·6	2	423·9	..	..	5	458·1	20	393·1	463·6
11. Smith, R. W.	Friesian..	3	337·5	3	363·6	..	..	5	365·0	..	..	1	408·1	6	466·8	18	396·5	452·5
12. Fairchild and Clutterbuck	Jersey ..	9	317·9	1	380·3	5	398·5	1	440·4	4	424·8	1	250·4	2	378·7	23	364·4	447·5
13. Handbury, J. E., and Son	,, ..	4	272·9	1	362·8	..	..	3	309·3	3	436·1	2	522·9	5	473·9	18	394·8	447.4
14. Colenso, L. W.	,, ..	7	288·1	1	323·7	1	390·6	2	395·6	4	447·8	1	403·1	7	447·5	23	384·7	446·1
15. Bennett, R. H.	,, ..	..	..	7	345·6	..	..	..	..	3	393·5	2	388·2	9	440·1	21	397·0	441·0
16. Department of Agriculture	Friesian..	4	300·5	1	370·7	4	365·8	..	..	2	373·4	3	374·2	7	449·7	21	383·5	436·0
17. Huffer, J. A.	Jersey ..	5	299·8	2	355·2	1	329·6	3	320·6	3	420·6	1	373·7	2	461·4	17	356·4	428·0
18. Vagg, E. J.	,, ..	5	287·9	4	313·2	1	297·9	2	357·2	4	360·8	1	301·2	2	525·5	19	342·1	416·7
19. Nicholas, M. A.	,, ..	2	382·8	3	338·7	1	361·3	3	359·8	2	434·4	1	427·4	9	345·9	21	363·4	409·3
20. Tyssen, C. J.	,, ..	3	276·5	1	325·5	1	341·3	3	332·8	4	406·8	1	427·9	10	369·0	23	358·2	401·4
21. Phillips, J. H.	,, ..	7	237·2	4	330·2	2	351·3	2	341·4	..	..	..	..	5	407·6	20	320·2	398·7
22. Parker, L. M.	Dairy Shorthorn	..	..	2	315·9	3	356·2	2	333·3	..	..	1	380·5	11	368·9	19	358·2	390·7
23. Macauley, C. W.	Jersey ..	6	272·8	1	285·6	1	274·7	1	295·5	3	334·7	1	402·7	4	374·5	17	317·5	383·2
24. Hore, M. T.	Friesian..	6	243·5	..	..	3	240·7	1	339·4	..	..	1	410·8	6	419·4	17	320·6	382·7
25. Tomasetti, B. G.	Ayrshire	3	261·7	1	251·7	8	310·5	3	297·8	3	318·5	..	..	6	373·9	24	317·2	380·1
26. Meaklim Bros.	Dairy Shorthorn	4	261·6	2	287·0	3	282·3	2	298·1	1	227·0	1	323·0	7	391·0	20	317·5	375·6
27. Maher, R. H.	Jersey ..	1	228·4	6	274·8	2	281·8	4	324·2	1	298·0	1	394·3	3	315·2	18	298·6	365·7
28. Langlands, F. B.	,, ..	3	191·1	4	327·3	1	267·7	1	329·4	3	290·8	3	387·8	2	279·5	17	298·5	363·6
29. Cook, D. E.	,, ..	3	214·2	4	267·6	1	268·6	2	331·9	3	291·7	2	318·0	9	359·2	24	307·9	359·1
30. Alston, Mrs. N. B., and Sons	,, ..	1	258·7	1	285·6	1	280·7	2	333·8	..	..	1	358·3	10	344·0	16	330·7	358·7
31. Nash, L.	,, ..	8	225·7	4	264·3	..	..	2	241·2	2	302·8	..	..	6	383·1	22	284·1	358·5
32. Coulthard, J. J.	,, ..	5	255·3	1	285·6	2	251·8	1	415·1	..	..	2	274·0	4	327·0	15	289·1	355·8
33. Butcher, F. T.	Red Poll..	3	207·2	4	230·8	1	375·3	..	..	1	399·9	3	314·7	6	355·9	18	301·2	355·0
Herds of 10 to 14 Cows.																		
1. Goddard, J. H.	Ayrshire	3	359·3	1	480·8	..	..	..	..	1	593·3	1	825·7	5	512·0	11	503·5	550·7
2. Mitchell, R. H.	Jersey ..	4	404·8	1	373·0	..	..	..	..	..	..	1	541·9	5	471·6	11	444·7	499·3
3. Masters, S. H., and Son	,, ..	2	356·6	1	428·3	2	369·5	1	533·9	2	477·6	..	..	5	474·2	13	441·6	490·8
4. Walker, C. S.	Friesian..	2	307·0	1	241·9	..	..	2	410·9	1	349·0	..	..	4	513·2	10	420·0	470·0
5. Gay, R. G., and Son	Jersey ..	4	326·9	..	..	2	403·9	..	..	1	449·2	..	..	7	460·1	14	413·2	461·8
6. Hodgins, G. E.	Jersey ..	10	320·9	..	..	..	..	..	..	..	..	..	..	1	551·1	11	341·8	450·9
7. Shearman, A. and W.	,, ..	2	317·5	2	388·1	..	..	3	435·4	..	..	..	..	3	387·2	10	387·9	449·9
8. Dennis, Mrs. A. A.	,, ..	2	328·9	3	398·0	1	348·3	1	319·3	..	..	..	..	3	431·3	10	381·3	449·3
9. Fixter, A.	Guernsey	3	296·2	1	400·7	2	401·1	..	..	3	376·9	..	..	3	470·8	12	386·7	448·4
10. Clark, P. W.	Jersey ..	3	346·7	..	..	4	303·4	..	..	..	..	1	648·1	6	428·2	14	390·8	440·8
11. Murdoch, J., and Son	,, ..	4	299·9	2	382·2	..	..	1	450·5	..	..	1	366·9	2	401·6	10	358·4	434·4
12. Vaughan Bros.	,, ..	8	315·7	..	..	1	412·0	..	..	1	426·1	1	423·7	3	374·4	14	350·7	429·3
13. St. Joseph's Home	,, ..	3	305·9	1	321·3	1	412·2	1	356·0	4	388·4	..	..	2	384·2	12	360·7	424·1
14. Cowan, G. L. S.	Friesian..	2	277·8	2	320·5	..	..	..	..	1	444·7	..	..	9	415·8	14	384·6	418·8
15. Stirling, H. V.	Jersey ..	5	295·0	1	426·3	..	..	1	330·6	..	..	1	324·5	2	415·3	10	338·7	416·7
16. Austin, F.	,, ..	4	268·7	4	360·8	2	342·6	1	379·3	..	..	..	..	2	366·8	13	332·0	416·6
17. Clark, W. J.	,, ..	4	296·1	..	..	2	291·1	..	..	2	417·2	1	414·6	5	403·0	14	359·3	412·2
18. Whelpton, B.	,, ..	5	311·9	2	343·0	..	..	1	353·1	2	353·1	..	..	4	377·6	14	343·9	411·1
19. Chadderton, J. E.	,, ..	3	288·0	..	..	2	339·9	..	..	1	360·3	2	441·0	5	388·9	13	363·9	410·0
20. Trewin, J. V.	,, ..	6	288·4	1	388·7	..	..	1	347·7	..	..	..	..	3	352·9	11	320·5	400·5
21. Broad, Mrs. A. A.	,, ..	3	273·9	2	316·4	3	342·1	1	349·1	1	401·3	..	..	3	342·5	13	327·6	396·8
22. Hardie, R.	,, ..	4	353·0	..	..	..	..	..	..	..	..	..	..	7	351·2	11	351·8	395·5
23. Broad, A. J.	,, ..	3	261·6	3	349·1	..	..	2	396·1	1	305·7	1	321·2	4	360·1	14	335·1	395·1
24. Wade, W. J.	,, ..	..	..	1	328·3	2	413·4	..	..	..	..	..	..	10	368·6	13	372·4	392·4
25. Black, Estate of the late I. S.	Ayrshire	4	274·4	..	..	2	308·1	3	327·1	1	386·8	1	309·2	3	394·6	14	326·8	389·6
26. Hicks, E. J.	Jersey ..	4	272·6	3	292·6	..	..	..	..	..	..	2	402·4	3	336·6	12	315·2	383·6
27. McIlvale, I., and Sons	,, ..	1	317·5	..	..	..	..	1	243·2	2	353·3	1	439·9	7	333·0	12	336·5	359·8
28. Andrew, W.	Ayrshire	7	248·9	2	269·2	1	285·9	1	375·6	1	290·2	1	154·4	..	..	13	260·5	355·9
29. Tandberg, G. A., and Son	Illawarra Shorthorn	3	210.7	..	..	2	307.8	1	351.8	1	307.8	..	..	6	331.6	13	306.7	354.4

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69	Longerenong Agricultural College	Dooen	43
Banyule Stud Pty. Ltd.	Wangaratta ..	42	McNabb and Son, G. A.	Irrewillipe East ..	177
Black, I. S., Estate ..	Mount Noorat ..	52	Onley, W. H. ..	"Glenholme," Caldermeade	50
Clarke, A. B. ..	Glenormiston South	16			
Dennis, Mrs. A. A. ..	Frankston.. ..	33	Payne, A. E. T. ..	"Yarra View," Lilydale	63
Dookie Agricultural College	Dookie	77	Payne, T. E. N. ..	"Woodburn," Kilmore	46
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18	Powell, T. S. ..	"Carellen," Mansfield	46
Geelong Grammar School	Corio	56	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29	Samuel, Misses G. and E.	Lang Lang ..	48
Gorman, A. W. ..	"Cathcart," Alexandra	61	School of Horticulture	Burnley	9
Holloway, R. W. ..	Caldermeade ..	70	State Experiment Farm	Rutherglen ..	40
Kilmany Park Farm Home for Boys	Sale	94	State Research Farm	Werribee	229
Lawrence, P. H. ..	"Rainga," Tarrawarra	72	Wells, W. G. ..	Caldermeade ..	65

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43	Carr, W. J. ..	Wollert	65
Andrew, J. C. ..	Whittlesea ..	121	Child, G. P. ..	Epping	53
Andrew, W. ..	Whittlesea ..	160	Christian Bros. ..	Doreen	41
Andrews, E. H. ..	Templestowe ..	19	Clark, P. W. ..	Whittlesea ..	62
Balharrie, J. A. ..	Whittlesea North ..	59	Clements, M. and L., and Son	Bundoora	135
Barclay, A. H. ..	Whittlesea ..	107	Cobain, J.	Thomastown ..	40
Barling, J. ..	Mernda	39	Collins, L.	Doreen	74
Batten, R. J. ..	Wollert	44	Cornfoot, D. H. ..	Whittlesea ..	25
Bebbington, J. ..	Whittlesea ..	92	Cotchin, J. ..	Woodstock ..	18
Benson, R. ..	South Morang ..	28	Coulthard, J. J. ..	Whittlesea ..	66
Bodycoat, A. ..	Wollert	39	Cox, E. H. ..	Lower Templestowe	37
Booth, Mrs. A. ..	Warrandyte ..	8	Craker, Mrs. E. ..	Warrandyte ..	2
Bourke, G. J. ..	Fairfield	82	Cumming, H. R. ..	South Morang ..	20
Bradbury, A. K. ..	Diamond Creek ..	31	Cunningham, E. C. ..	Templestowe ..	23
Buckley, F. J. ..	Mernda	104	Danaher, J. V. ..	Whittlesea ..	63
Bunting, J. ..	Epping	35	Danns, N. C. ..	Whittlesea ..	34
Butler, W. ..	Wallan	49	Dennett, C. A. ..	Cragieburn ..	38
Callaghan, L. ..	Epping	34	Deutscher, H. W. ..	Mernda	168
Callaghan, T. F. ..	Thomastown ..	40			

Tubercle-free Herds—*continued.*

Name.	Address.	Number in Herd at Last Test.
Deveny, M.	Bundoora	51
Drysdale, J. C.	Warrandyte	37
Evans, Miss M.	Bundoora	29
Fellows Bros.	West Heidelberg	52
Fergusson, M. A.	Whittlesea	92
Fitzsimons, B.	Lower Templestowe	30
Fox, A.	Mernda	59
French, T. W.	Wollert	43
Gallus, E. A.	Doncaster	11
Gardiner, C. E.	Epping	20
Gibbs, C.	Arthur's Creek	28
Graff, Mrs. M. G.	Mernda	24
Graham Bros.	Whittlesea	71
Green, W.	Mernda	11
Hall, J. E., Mrs.	Whittlesea North	13
Hancorne, Miss M. R.	Yan Yean	27
Harding, J. E.	Templestowe	42
Hargreave, Mrs. E. J.	Whittlesea	21
Harkness, H. J.	South Morang	31
Harmer, R. E.	Wollert	38
Hawkes, Miss D.	Warrandyte	19
Hehr, H.	Epping	32
Hehr, R.	Wollert	23
Henshaw, Miss A.	Templestowe	16
Herd, J.	Epping	46
Hewitt, C. J.	Wattle Glen	8
Higgs, R. N.	Yan Yean	76
Hobbs, Mrs. F. J.	Doncaster East	6
Hobbs Bros.	Heidelberg	65
Howden, A.	Epping	29
Howell, G. G.	Wollert	221
Hughes, J.	South Morang	1
Hussey, Mrs. S.	Warrandyte	1
Jackson, Mrs. M. A.	Heidelberg	7
Jenkins, T. H.	Whittlesea	24
Johnstone, J. A., Miss	Mernda	14
Jones, A. J.	South Morang	30
Jukes, C.	Epping	39
Jukes, W. H.	South Morang	35
Junor, G. M.	South Morang	37
Kell, W. E.	Greensborough	21
Lay, P.	Alphington	30
Loft, A. H.	Wollert	52
McCormack, D.	Woodstock	33
McDonald, A. J.	Whittlesea	2
McDowell, R. H.	Greensborough	28
McGregor, W. B.	Mernda	41
McKay, J. M.	Coburg	62
McKay, L.	Kal Kallo	12
McKendry, J.	Doreen	47
McKernan, A. H.	Whittlesea	24
McKie, J. W.	Wollert	83
McLean, J. F.	Bundoora	32
McPhee, K.	Whittlesea	116
McPherson, A.	Yan Yean	64
Mason, N.	Donnybrook	52
May, Mrs. M.	Warrandyte	5
Mays, Mrs. A. M.	Doncaster	5
Merriman, J.	Diamond Creek	17
Miller, A. J.	Whittlesea North	47
Miller Bros.	Greensborough	36
Mosig, H. C.	Epping	24
Nalder, H. S.	Epping	20
Nash, H. A.	Tullamarine	41
Nebel, Mrs. A. E.	Thomastown	38
Norton, O. G.	Bundoora	37
O'Hern, T.	Epping	58
O'Loughlin, W. L.	Epping	27
Parker, Mrs. A. E.	Greensborough	24
Pentland, C. V.	Templestowe	17
Pettit, W. H.	Thomastown	36
Pitson, R H.	Yarrambat	17
Power, L. J.	Mernda	52
Quinlan Bros.	Epping	49
Raper, L. R.	Greensborough	36
Rawlings, J. H.	Whittlesea North	41
Righetti, L. A.	Lower Templestowe	40
Robson, Mrs. G. A.	South Morang	47
Rodgers, E.	Whittlesea North	11
Rosewarne, Miss P.	Yan Yean	43
Ross, A.	Templestowe	5
Salcki, S.	Thomastown	51
Seeber, B.	Thomastown	24
Shanks, John	Mernda	73
Sheeky, A. A.	Templestowe	14
Short, E.	East Preston	99
Siebel, F.	Thomastown	26
Simpson, W. G.	Donnybrook	12
Skals, P.	Rosanna	28
Smirfitt, J. E.	Epping	39
Smith, G. A.	Templestowe	63
Smith, J. R.	Mernda	34
Smith, L. McA.	Yan Yean	2
Smith, L. W.	Bundoora	73
Smith, P. A.	Ivanhoe	2
Smith, R. A.	Epping	27
Smith, S. E.	Epping	31
Southon, H. W.	South Morang	27
Stephens, H.	Epping	48
Stimson, T.	Woodstock	33
Tarry, J.	South Morang	24
Thomas, W. C.	Yan Yean	31
Towt, C. W.	Glenvale	136
Trethowan, F. W.	Donnybrook	94
Trist, H. P.	Greensborough	8
Troutbeck, H. R.	Mickleham	47
Vallence, C. A.	Epping	11
Van, E. L.	Templestowe	28
Walsh, J. B.	Templestowe	11
Whelpton, B.	Whittlesea North	59
White, W.	Greensborough	18
Whittingham, F. W.	Greensborough	40
Williams, E. A.	Thomastown	33
Williamson, J.	Doncaster (High-street)	5
Willis Bros.	Craigieburn	61
Wilson, J. E.	Diamond Creek	35
Wilson, Mrs. M.	South Morang	14
Wood, A. V.	Yan Yean	125
Wrest, W.	Epping	76
Wuchatsch, J. D.	Epping	14
Yann, R.	Wollert	52
Young, Mrs. A.	Wollert	33
Ziebell, H.	Thomastown	32

There are also 85 herds in which 3,786 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Advanced Register of Merit for Standard Herd Test. (273 Day Period of Test.)

For greater facility of reference, cows are grouped according to breed, the order of the cows within the group being according to yield. The minimum yield is an equivalent of 400 lb. butter-fat per cow over four successive years of test. In arriving at the equivalent, allowances are credited to immature animals as follows:—

Two-year-olds receive 30 per cent.; three-year-olds receive 20 per cent.; and four-year-olds receive 10 per cent. allowance.

In the life-time section, where the total number of record to date are considered, it may be inferred that the cow has calved regularly since calving first as a two-year-old—when three junior records are indicated—where four are shown, it is evident that first calving occurred at a very early age.

Name of Cow with Herd Book No.	Production Attainment (Average of Four Best Consecutive Yields).	Details to Date of Life Time. (No. age allowances.)						Details of Breeding.		Name of Owner.
		Date of Birth.	No. of Test Records.		Highest Individual Record.	Average Yield over all Lactations.		Name and H.B. No. of Sire.	Name and H.B. No. of Dam.	
	B.-fat (lb.).		Under 5 yrs.	Over 5 yrs.	Fat (lb.).	Milk (lb.).	B.-fat (lb.).			
AYRSHIRES.										
Inverurie Blue Bell (30700) ..	821	10.9.36	4	..	825	14,913	678	Inverurie Laddie (9859) ..	Donside Thistledown 2nd (23662)	J. H. Goddard
Donside Lido Lady (23657) ..	628	16.10.29	1	5	748	12,838	598	Olivedale Chum (6341) ..	Donside Loco Lady (23656)	J. H. Goddard
Inverurie Maggie (27417) ..	532	17.7.32	2	5	672	9,535	449	Oakbank Radio (5983) ..	Donside Mary (23659) ..	J. H. Goddard
Donside Thistledown 2nd (23662)	515	29.9.29	1	4	649	11,234	492	Olivedale Chum (6341) ..	Donside Thistledown (23661)	J. H. Goddard
Glencorren Violetta (20120) ..	485	27.7.28	3	5	506	9,896	407	Glen Athol Jimmy (6211)	Glen Athol Violet (13652)	B. G. Tomasetti
Glencorren Foam (21505) ..	477	7.8.29	3	4	481	8,538	423	Glen Athol Brilliant (6729)	Glen Athol Fashionable (12242)	B. G. Tomasetti
Glencorren Gracie (31415) ..	463	3.9.35	3	1	485	9,237	410	Tregorland King (8348) ..	Glen Athol Graceful (20074)	B. G. Tomasetti
Mount Noorat Georgina 5th (29777)	451	24.3.35	3	1	466	8,846	395	Gowrie Park Scottish Patron (7654)	Mt. Noorat Georgina (24146)	Estate of the late I. S. Black
Carracoorte Betsy 22nd (24674) ..	439	16.9.30	2	5	525	8,675	402	Blue Bell's Pride of Glencourt (4279)	Carracoorte Betsy 19th (17445)	Thomas and Taylor
Alvaston Margot (31923) ..	432	16.7.36	3	1	472	9,176	384	Cathcart Masterpiece (9178)	Glen Gowrie May (24997)	B. G. Tomasetti
Crescent Farm Beryl 3rd (32136)	427	7.12.35	3	1	463	8,358	379	Crescent Farm Gordon (9782)	Crescent Farm Pearl's Pet (25975)	J. H. Goddard
Carracoorte Brownie's Belle (23547)	419	19.8.29	3	4	483	6,771	362	Garty's Producer of Carracoorte (5502)	Carracoorte Brownie (13604)	W. Henderson
Glencorren Belle (28444) ..	406	7.8.33	3	3	419	7,795	358	Gowrie Park Scottish Emblem (9290)	Glencorren Joy Belle (22831)	B. G. Tomasetti
DAIRY SHORTHORNS.										
Willow Park Duchess 30th (545D)	588	22.8.35	3	1	686	13,129	522	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Duchess 23rd (1283E)	W. K. Atkinson
Willow Park Melba 15th (1315E)	500	22.3.33	3	3	529	10,285	560	Willow Park Lustre 3rd (620F)	Willow Park Cherry (1227E)	W. K. Atkinson
Willow Park Damsel 3rd (1264E)	499	3.9.32	3	4	470	10,165	430	Willow Park Imperial 3rd (613F)	Willow Park Damsel 2nd (1263E)	W. K. Atkinson
Willow Park Damsel 2nd (1263E)	492	7.10.26	3	5	542	10,906	480	Willow Park Reflector (629F)	Willow Park Damsel (1262E)	W. K. Atkinson

Drumneil Lily (775E)	489	17.10.32	2	4	551	12,056	476	Willow Park Reformer (253F)	Drumneil Queenie (785E)	Meaklim Bros.
Drumneil Lily 2nd (1846E) ..	488	15.2.36	3	1	476	10,460	429	Willow Park Lustre 3rd (620F)	Drumneil Lily (775E) ..	Meaklim Bros.
Willow Park Countess 9th (1244E)	483	30.8.30	2	6	489	11,139	458	Willow Park Imperial 2nd (612F)	Willow Park Countess 4th (1240E)	W. K. Atkinson
Willow Park Countess 10th (1245E)	480	17.2.31	3	5	553	11,818	454	Willow Park Reflector (629F)	Willow Park Countess (1273E)	W. K. Atkinson
Willow Park Camelia 18th (5247)	478	2.9.35	3	1	470	11,270	420	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Camelia (1211E)	W. K. Atkinson
Willow Park Duchess 33rd (1670D)	476	12.10.36	4	..	435	1,016	391	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Duckess 7th (1268E)	W. K. Atkinson
Willow Park Countess 17th (534D)	471	27.10.34	3	2	525	11,123	417	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Countess 8th (1243E)	W. K. Atkinson
Willow Park Comet 7th (1231E)	467	12.12.29	3	6	497	11,711	434	Willow Park Design (579F)	Willow Park Comet 2nd (1228E)	W. K. Atkinson
Drumneil Nellie 3rd (779E) ..	457	21.2.33	3	3	454	11,033	395	Willow Park Reformer (253F)	Drumneil Nellie (777E) ..	Meaklim Bros.
Willow Park Melba 11th (1311E)	457	20.8.32	4	2	481	9,924	393	Willow Park Imperial 3rd (613F)	Willow Park Melba 6th (1306E)	W. K. Atkinson
Willow Park Comet 14th (528D)	435	22.7.34	3	2	436	9,566	383	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Comet 7th (1231E)	W. K. Atkinson
Willow Park Duchess 26th (1286E)	432	16.9.33	3	3	430	8,848	378	Willow Park Imperial 3rd (613F)	Willow Park Duchess 7th (1268E)	W. K. Atkinson
Willow Park Comet 9th (1233E) ..	431	3.4.32	3	2	406	9,193	355	Willow Park Imperial 3rd (613F)	Willow Park Comet 2nd (1228E)	W. K. Atkinson
Drumneil Queenie (785E) ..	430	27.9.24	..	5	461	10,273	429	Willow Park Rosemont (256F)	Willow Park Queenie (1341E)	Meaklim Bros.
Drumneil Roanie 2nd (788E) ..	427	10.10.31	2	2	434	9,192	398	Willow Park Reformer (253F)	Drumneil Roanie (787E)..	Meaklim Bros.
Willow Park Dainty 14th (1667D)	425	25.9.36	4	..	411	10,055	358	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Dainty 5th (1254E)	W. K. Atkinson
Willow Park Melba 22nd (1321E)	424	3.9.34	3	2	432	9,995	382	Willow Park Lustre 3rd (620F)	Willow Park Melba 11th (1311E)	W. K. Atkinson
Willow Park Melba 27th (556D) ..	423	20.2.36	3	1	418	9,469	372	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Melba 2nd (1302E)	W. K. Atkinson
Willow Park Damsel 5th (1266E)	418	25.9.34	4	1	422	8,949	341	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Damsel 2nd (1263E)	W. K. Atkinson
Willow Park Duchess 7th (1268E)	409	7.10.25	3	7	443	8,588	362	Willow Park Count (383E)	Willow Park Duchess (196F)	W. K. Atkinson
Willow Park Duchess 28th (543D)	408	9.9.34	3	2	446	9,003	354	Wicklesham Lord Barrington 5th (Imp.) (153A)	Willow Park Duchess 15th (1275E)	W. K. Atkinson
Willow Park Moss Rose 8th (1329E)	405	14.9.32	2	4	438	1,0307	376	Willow Park Sherlock (634F)	Willow Park Moss Rose 3rd (1324E)	W. K. Atkinson

FRIESIANS.

Victoria Belfry (5104)	541	26.5.34	3	2	664	14,026	513	Victoria Joyous Mercedes (985)	Victoria Tinkle Bell (3266)	State Research Farm
Victoria Quilt (3767)	520	26.2.29	3	4	586	12,141	492	Victoria Topnote (674) ..	Victoria Patchwork (1706)	State Research Farm
Greenvale Segis Patch (3495) ..	500	24.11.28	1	4	637	14,324	486	Lydholm Segis Paxton (386)	Burnbank Spring Patch (1819)	M. T. Hore
Victoria Songstress (3768) ..	483	23.8.29	2	4	526	14,691	452	Victoria Joyous Mercedes 985	Victoria Songbelle (1708)	State Research Farm
Victoria Woodcrest Daisy (5112) ..	472	24.10.32	3	4	566	11,883	427	Victoria Joyous Mercedes (985)	Victoria Songbelle (1708)	State Research Farm
Warwick Maggie Woodcrest (C.R.)	459	28.2.33	3	3	636	14,847	465	Greenvale Woodcrest Oakwood 2nd (1470)	Burnbank Maggie Alcartra (3392)	C. S. Walker
Victoria Oxeye (6094)	418	22.2.36	3	1	399	9,768	366	Victoria Double Top (1354)	Victoria Woodcrest Daisy (5112)	State Research Farm
Elmar Ideal Patch (3973) ..	405	28.2.31	3	4	432	11,445	353	Greenvale Oakwood Posch (1148)	Greenvale Segis Patch (3495)	M. T. Hore

GUERNSEYS.

Yarraview Teeney (6648) ..	582	19.8.35	3	1	534	9,779	498	Camilla's Majestic of Maple Lodge (Imp.) (2544)	Yarraview Gem's Lady (1495)	Capt. A. E. T. Payne
Clara's Fashion 7th (Imp.) (6652)	573	26.12.32	3	2	663	10,831	511	Sunrise of Maple Lodge (5569) P.S.	Clara's Fashion (21421) P.S.	Capt. A. E. T. Payne

Advanced Register of Merit for Standard Herd Test. (273 Day Period of Test)—*continued.*

Name of Cow with Herd Book No.	Production Attainment (Average of Four Best Consecutive Yields).	Details to Date of Life Time. (No. age allowances.)						Details of Breeding.		Name of Owner.
		Date of Birth.	No. of Test Records.		Highest Individual Record.	Average Yield over all Lactations.		Name and H.B. No. of Sire.	Name and H.B. No. of Dam.	
	B.-fat (lb.).		Under 5 yrs.	Over 5 yrs.	Fat (lb.).	Milk (lb.).	B.-fat (lb.).			
***Guernseys*—continued.**										
Yarraview Alys (6623)	515	18.5.35	3	1	511	8,783	453	Yarraview Contralto (2292)	Rose Gem of Maple Lodge (Imp.) (3933)	Capt. A. E. T. Payne
Yarraview Delight (5167) ..	480	25.8.32	2	3	486	8,746	446	Camilla's Majestic of Maple Lodge (Imp.) (2544)	Clara 2nd of Maple Lodge (Imp.) (3932)	Capt. A. E. T. Payne
Avonview Dulcie (2537) ..	449	3.1.30	4	4	481	6,840	387	Melbourne Sand Boy 6th (1389)	Pernleigh Daphne (2680)	A. Fixter
JERSEYS.										
Mornmoot Princess Madeira (37071)	810	24.2.31	4	5	794	10,687	607	Werribee Grandmaster (6052)	Werribee Princess Madeira 2nd (33143)	R. M. Chirnside
Mornmoot Princess Madeira 3rd (45269)	755	11.1.33	3	3	734	11,254	653	Staghorn Larkspur's Majestic (8683)	Mornmoot Princess Madeira (37071)	R. M. Chirnside
Rintoul View Petal (37339) ..	695	18.9.30	4	2	624	9,571	564	Banyule Triplane (5753)..	Relbia Lucy (15737) ..	N. H. Enders
Mornmoot Fancy Starbright (45256)	678	20.4.33	3	4	705	10,212	611	Werribee Prince Madeira (6054)	Brucevale Fancy Starbright 2nd (25802)	R. M. Chirnside
Belgonia Junette 5th (60541) ..	677	23.9.36	4	..	713	9,924	560	Design's Ruler (Imp.) (7804)	Belgonia Junette (38829)	P. J. Maloney
Mornmoot Mimi (58567) ..	675	3.9.36	4	..	660	10,207	556	War Valor (Imp.) (9141)	Werribee Mimi (33118) ..	R. M. Chirnside
Ballara Bonnie (33911)	674	19.7.29	3	6	691	9,078	591	Brucevale Lord Fancy Madeira (7920)	Garenne 2nd of Brucevale (17719)	Estate of the late F. A. Williams
Werribee Stellar Princess (37073)..	664	20.10.29	4	2	736	11,222	581	Werribee Butter King (4802)	Werribee Lady Starbright (21179)	G. E. Hodgins
Mornmoot Clementine (41121) ..	641	6.1.32	4	3	566	8,763	512	Werribee Prince Madeira (6054)	Melrose Clementine (28551)	T. S. Powell
Belgonia Eileen 2nd (42921) ..	633	15.8.32	3	3	690	10,412	598	Duke of the Lake (Imp.) (7805)	Eileen 2nd of Clarendon Eyre (13521)	Devon Park Stud Farm
Finchley Canary 3rd (37092) ..	632	18.9.29	3	5	635	8,734	523	Werribee Lord Burnham (5760)	Canary 2nd of Lysterfield (10431)	T. M. Noble and Son
Mornmoot Princess Madeira 5th (49660)	626	11.12.33	4	2	571	7,965	505	Werribee Jupiter (9047)..	Mornmoot Princess Madeira (37071)	G. S. Grice
Grangelea Rose (33040)	623	27.9.29	3	4	567	9,427	480	Banyule Aero (5751)	Grangelea Roseleaf 2nd (26394)	Mrs. A. A. Broad
Tooravale Princess 9th (46479) ..	618	31.10.30	3	4	627	8,609	524	Tooravale Gold Speck 5446)	Princess 2nd of Strathbow (12206)	J. E. Handbury and Son
Bamawm Primrose (47102) ..	614	1.9.33	3	3	672	10,800	571	Bamawm Bonnie Boy (10343)	Wompini Rose Marie (29485)	Estate of the late F. A. Williams
The Wattles Petal (55522) ..	614	26.8.34	3	3	614	8,894	529	Banyule Supine (7998) ..	Rintoul View Petal (37339)	N. H. Enders
Leven Brae Perree's Girl (34002)..	614	10.9.29	4	3	573	8,736	494	Werribee Gaypiece (4823)	Twylish's Perree of Leven Brae (21276)	G. S. Grice
Pine Ridge Lady (68651) ..	605	16.12.36	4	..	534	9,437	496	Duke of the Lake (Imp.) (7805)	Bellaire Princess 4th (37122)	Nancarrow Bros.
Rydon May Queen 2nd (55151) ..	599	8.8.33	3	4	648	10,213	538	Melrose Migrant (6874) ..	Elanora May Queen 2nd (38289)	E. J. Vagg
Belgonia Junette 3rd (56321) ..	590	5.8.35	3	1	611	9,489	521	Design's Ruler (Imp.) (7804)	Belgonia Junette (30029)	P. J. Maloney
Rutland Brunette 10th (64153) ..	590	10.8.35	3	2	624	9,282	516	King's Vale Lauder (10792)	Rutland Brunnette 3rd (41919)	S. H. Masters and Son
Springhurst Tomato 3rd (38110)	587	24.6.30	3	4	564	8,195	495	Starbright's Prince of Glen Iris (3345)	Tomato of Springhurst (18939)	Estate of the late J. D. Read

Selsey Free Girl (65061) ..	586	2.9.36	4	..	745	7,844	489	Wonderful Standard 2nd (79236)	Brampton Standard Free Girl (56049)	T. M. Noble and Son
Rintoul View Rose Marie (38214)	582	3.10.30	3	3	579	7,911	474	Banyule Triplane (5753)..	Relbia Pinkie (25169) ..	N. H. Enders
Aveley Marie Antoinette 2nd (25648)	581	12.10.27	1	3	607	10,173	568	Marc Antony of Aveley (4142)	Marie Antoinette of Aveley (18496)	W. J. Wade
Mornmoot Fancy Madeira (37059)	578	28.1.31	4	..	607	8,641	475	Werribee Prince Madeira (6054)	Brucevale Fancy Madeira 2nd (25801)	W. G. Tait
Somerville Ramona (28781) ..	577	19.10.28	2	3	624	7,985	529	Banyule Aeronaut (5754)	Princess Wynn of Somerville (14159)	O. Ronalds
Avalon Starbright's Duchess (47062)	576	22.8.32	3	3	611	8,595	529	Brucevale Lord Starbright 3rd (9297)	Avalon Duchess (18612) ..	F. Austin
Clifford Farm Gladsome (23965) ..	575	1.4.32	3	5	718	8,005	502	Clifford Farm Eliminator (6120)	Linden Rita 4th (8439) ..	R. H. Mitchell
Clifford Farm Lady Sarah (34264)	572	31.1.30	3	2	529	7,714	481	Clifford Farm Eliminator (6120)	Linden Rita 4th (8439) ..	R. H. Mitchell
Belgonia Design's Eileen (51698) ..	571	18.8.34	3	3	562	8,133	499	Design's Ruler (Imp.) (7804)	Belgonia Eileen (38827) ..	P. J. Maloney
Strathbow Goldie 5th (26155) ..	571	26.3.28	3	3	617	7,742	517	Studley Noble (5146) ..	Goldie of Strathbow (9645)	F. Raggatt
Pine Ridge Duke's Silvermine (68649)	570	28.12.36	4	..	536	8,908	468	Duke of the Lake (Imp.) (7805)	Banyule Silvermine 27th (11603)	Nancarrow Bros.
Kooreena Carrie 4th (49033) ..	569	18.9.32	3	1	549	7,787	503	Kooreena Carrie 3rds Halo (9676)	Kooreena Carrie 2nd (34100)	Estate of the late W. H. Hurrey
Mer Vue Choice Contralto (63047)	568	29.9.35	4	1	538	7,625	470	Berrington Largo (9236)..	Mer Vue Choice 2nd (45131)	F. W. Clarke
Belgonia Suspense 6th (56325) ..	566	12.8.35	3	2	615	8,373	507	Design's Ruler (Imp.) (7804)	Belgonia Suspense (42698)	C. S. Grice
Monterey Melody's Mascot (58530)	564	20.6.34	3	2	595	9,856	509	Rosecliff Mariposa's Master (9127)	Mornmoot Melody 2nd (33134)	T. S. Powell
Myrtle Point Songstress (45341) ..	561	10.12.31	3	4	604	10,035	524	Werribee Master King (9084)	Songstress 10th of Brookfield (21571)	R. G. Gay and Son
The Wattles Princess 4th (50857)	559	17.11.33	4	3	512	8,257	467	The Wattles Biplane (8758)	The Wattles Princess 2nd (33990)	N. H. Enders
Windrest Rose Marie (55878) ..	555	2.11.33	4	2	618	7,808	436	Clarendon Eyre Eminent's Achievement (4154)	Aberdour Ranee (23519)	Dr. A. R. Haywood
Mornmoot Satisfaction 2nd (49661)	555	2.4.34	3	2	630	8,766	496	Werribee Jupiter (9047 ..	Werribee Princess Satisfaction (28543)	R. M. Chirnside
Maxon Countess Light (49425) ..	553	2.7.33	4	2	735	7,702	469	Maxon Count Graceful (6754)	Boorene Silver Light (25542)	G. A. McNabb and Son
Mer Vue Choice 4th (58404) ..	550	30.8.33	3	3	502	7,734	470	Woorayl Flashlight (5375)	Wood Choice (28590) ..	F. W. Clarke
Ballara Lassie 3rd (42861) ..	542	23.9.31	3	2	487	8,224	459	Brucevale Lord Fancy Madeira (7920)	Ballara Lassie 2nd (18999)	E. Hore
Avalon Madeira's Duchess (56188)	540	28.5.35	3	1	529	8,670	475	Mornmoot Prince Madeira (11919)	Avalon Noble's Duchess 3rd (47058)	P. Austin
Mornmoot Fancy Madeira 4th (54245)	539	7.11.34	3	1	489	7,863	459	Werribee Madeira's Ace (11223)	Mornmoot Fancy Madeira (37059)	R. M. Chirnside
Springhurst Sybil Tulip (55281) ..	539	29.9.34	4	2	513	7,523	446	Springhurst Golden Gamboge (11114)	Tulip 4th of Springhurst (21611)	Estate of the late J. D. Read
Strathbow Heather Belle (29326)..	538	29.7.28	3	5	546	6,792	450	Studleigh Noble (5146) ..	Mayland's Heather Belle (26150)	J. O'Neill
Ballara Bluebell 4th (38007) ..	537	17.9.30	3	3	519	8,232	455	Brucevale Lord Fancy Madeira (7920)	Ballara Bluebell (26250)..	J. O'Neill
Taranah Fairy (16716)	537	17.8.23	4	8	560	8,047	484	Melrose Lily 6th's Son (2188)	Taranah Nectar (11629)	J. J. Desmond
Tooravale Bettws-y-Coed 2nd (69402)	535	20.8.36	4	..	500	7,932	440	Pinewood's Aristocrat (13110)	Bettws-y-Coed of Woodside (19214)	J. E. Handbury and Son
Bellaire Molly 8th (37975) ..	533	21.3.30	3	5	585	8,751	496	Werribee Fancy Clementine King (3109)	Molly 5th of Bellaire (28586)	Nancarrow Bros.
Springhurst Blonde Nightshade (59486)	533	15.4.36	3	1	503	8,589	458	Bellefaire Seaborn Successor (6824)	Springhurst Nightshade 3rd (26170)	Estate of the late J. D. Read
Mornmoot Modesty 2nd (33138) ..	533	27.7.29	3	4	543	7,353	416	Choirmaster of Banyule (2712)	Queen Jessie of the Falls (17812)	K. E. Watson
Springhurst Coronation Narcissus (50625)	533	21.4.34	3	3	585	8,344	468	Springhurst Design's Analyst (11112)	Springhurst Sybil Narcissus (46191)	Estate of the late J. D. Read
Mer Vue Choice 3rd (54081) ..	532	21.7.33	3	3	532	7,636	456	Woorayl Flashlight (5375)	Mer Vue Choice 2nd (45131)	F. W. Clarke
Victoria Flirt (33272)	532	21.3.30	3	6	614	7,297	464	Victoria Jack Tar (6663)	Victoria Charm (28657) ..	Department of Agriculture, Burnley

Advanced Register of Merit for Standard Herd Test. (273 Day Period of Test)—*continued.*

Name of Cow with Herd Book No.	Production Attainment (Average of Four Best Consecutive Yields).	Details to Date of Life Time. (No. age allowances.)						Details of Breeding.		Name of Owner.
		Date of Birth.	No. of Test Records.		Highest Individual Record.	Average Yield over all Lactations.		Name and H.B. No. of Sire.	Name and H.B. No. of Dam.	
	B.-fat (lb.).		Under 5 yrs.	Over 5 yrs.	Fat (lb.).	Milk (lb.).	B.-fat (lb.).			
***Jerseys*—continued.**										
Finchley Master's Canary (52727)	531	17.9.33	3	3	563	7,544	484	Finchley Masterman (9457)	Finchley Canary 3rd (37992)	T. M. Noble and Son
Inverbroom Silvermine's Marie (44392)	531	16.9.32	3	3	589	8,879	408	Economist of Aveley (4522)	Aveley Marie Antoinette 2nd 25648)	W. J. Wade
Bamawm Pretty Lady (56239) ..	531	2.10.34	4	2	634	7,726	449	Bamawm Master Gaypiece (11338)	Bamawm Bonnie Lass (47099)	Estate of the late F. A. Williams
Bamawm Ruth (60474)	531	4.11.34	2	2	535	9,094	489	Bamawm Leon (9108) ..	Taranah Ruby 2nd (42120)	Estate of the late F. A. Williams
Monterey Maid's Mermaid (58528)	531	24.6.34	3	2	608	9,328	473	Rosecliff Mariposa's Master (9127)	Mornmoot Maiden (33125)	T. S. Powell
Barrowby Rose Fancy (56280) ..	529	2.3.34	4	2	541	7,327	399	Wompini Twilight (10227)	Marimba Briar Rose 3rd (29567)	E. L. Jefferson
Weir View Golden Design 2nd (59968)	529	24.12.35	4	..	477	7,582	411	Weir View Golden Duke (12327)	Weir View Blossom's Design (51160)	C. S. Walker
Springhurst Sybil Soya (50634) ..	529	17.4.34	3	2	601	9,250	468	Bellefaire Seaborn Successor (6824)	Springhurst Soya (38107)	Estate of the late J. D. Read
Waratta Ellen Bell (28661) ..	528	18.8.27	3	5	549	9,136	473	Jubilee Lifelight (3246) ..	Waratta Dolly's Bell (12181)	J. J. Desmond
Bamawm Fancy Gem (47100) ..	528	29.8.33	3	4	616	7,948	482	Bamawm Leon (9108) ..	Ballara Garenne's Fancy 6th (38780)	Estate of the late F. A. Williams
Normandie Buttercup 2nd (33188)	524	13.7.29	4	7	505	7,231	412	Peer of Lewisham (4483)	Buttercup of Hazelbrook (18665)	L. W. Colenso
The Wattles Silvermine 2nd (55525)	524	24.7.34	3	2	514	8,005	466	Woodside Chrissy's Gamboge (11251)	The Wattles Silvermine (46425)	N. H. Enders
Clifford Farm Norma (61102) ..	523	12.11.35	4	..	541	6,856	434	Wompini V.C. (4550) ..	Brucevale Kinglark's Satisfaction (37947)	R. H. Mitchell
Avalon Starbright's Pansy 4th (56189)	520	1.6.35	4	..	522	7,850	448	Brucevale Lord Starbright 3rd (9297)	Avalon Gladstar's Pansy 6th (38723)	F. Austin
Jindivick Heroine 8th (57868) ..	519	12.8.34	3	2	532	10,181	486	Somerville Master Babs (8034)	Somerville Heroine 5th (38134)	O. Ronalds
Linga Longa Wattle's Speck (25574)	519	1.11.26	4	10	579	8,536	464	Canary's Handsome Boy of Linga Longa (5072)	Speck of Linga Longa (21113)	T. M. Noble and Son
Boorene Silver Light (25542) ..	519	7.3.28	3	7	519	7,319	438	Lady Grey's Silvermine 2nd of Somerset (3497)	Silvermine's Clara of Boorene (25250)	G. A. McNabb and Son
Monterey Maid (49602)	516	30.9.32	2	3	534	9,946	488	Mornmoot Starbright King (6572)	Mornmoot Maid (33125) ..	T. S. Powell
Lucerne Vale Madeira 3rd (49243)	515	8.5.34	4	2	546	7,379	423	Lucerne Vale Grandmaster (10855)	Lucerne Vale Madeira (44927)	N. C. De La Rue
Taranah Rainbow (42118) ..	514	3.12.30	4	4	487	7,037	396	Duke of Invermay (3693)	Taranah Roseleaf 2nd (29086)	C. W. Macauley
Taranah Floss (37857)	514	30.8.29	4	3	530	7,524	435	Duke of Invermay (3693)	Taranah Fairy (16716) ..	C. W. Macauley
Elm Grove Buttercup (21303) ..	514	2.8.25	2	3	553	8,884	470	Gold Star of Melrose (4248)	Dairymaid 5th of Waterloo Farm (17743)	R. G. Gay and Son
Orphanage Melba 11th (63536) ..	514	15.6.36	4	..	535	7,787	432	Murona Twylair (11932)	Orphanage Vanilla's Melba 3rd (36863)	Ballarat Orphanage
Milvue Design's Larkspur (63100) ..	514	24.7.36	4	..	447	6,903	420	*Belgonia Suspense's Design (12459)*	*Tavistock Larkspur (55437)*	*E. Hore*
Mornmoot Clementine 3rd (51213)	514	5.2.35	4	..	487	7,367	411	Werribee Madeira's Ace (11123)	Melrose Clementine (28551)	T. S. Powell
Troed-Yr-Rhiw Cariad 2nd (59027)	513	1.7.32	3	3	523	7,935	441	Montrose Duke of Glen Iris (6090)	Troed-Yr-Rhiw Cariad (23266)	T. J. Dunmore
Selsey Rose (11947)	513	4.6.31	3	3	504	7,630	426	Jubilee Asterlight (7860)	Jubilee Ranunculus (26186)	M. A. Nicholas

Springhurst Blonde Romneya (55272)	513	24.3.35	3	2	526	7,715	458	Bellefaire Seaborn Successor (6824)	Springhurst Romneya 3rd (29339)	Estate of the late J. D. Read
Springhurst Ronald's Alsyke (59498)	513	24.4.36	3	1	579	7,863	481	Bellefaire Seaborn Successor (6824)	Springhurst Alsyke 4th (29329)	Estate of the late J. D. Read
Avalon Starbright's Pansy 5th (56190)	511	3.8.35	4	..	486	7,901	419	Brucevale Lord Starbright 3rd (9297)	Avalon Mercedes Pansy 6th (28405)	F. Austin
Tooravale Lassie 17th (55589) ..	510	21.9.33	4	1	529	7,791	442	King's Vale Monica 14th's Son (6625)	Tooravale Lassie 2nd (25904)	J. E. Handbury and Son
Avalon Starbright's Duchess 2nd (51561)	509	4.10.34	3	1	551	8,458	445	Brucevale Lord Starbright 3rd (9297)	Avalon's Noble Duchess (32908)	F. Austin
Taranah Radiance 2nd (59334) ..	508	18.3.35	4	1	527	7,441	416	Taranah Commander (8913)	Taranah Radiance (37858)	C. W. Macauley
Rutland Bright Stockings 3rd (69024)	508	29.6.36	3	1	517	7,770	446	King's Vale Lauder (10792)	Rutland Bright Stockings (41918)	S. H. Masters and Son
Avalon Starbright's Pansy 3rd (51563)	507	2.8.34	3	1	543	7,703	443	Brucevale Lord Starbright 3rd (9297)	Avalon Mercedes Pansy 6th (28405)	F. Austin
Belgonia Peggy 9th (37898) ..	504	27/7/30	3	4	540	8,746	434	Aveley Rex (6612) ..	Belgonia Peggy 6th (29117)	Nancarrow Bros.
Tavistock Valerie (55444) ..	504	28.10.33	4	2	502	6,873	392	Werribee Ranger (5411) ..	Tavistock Honesty 3rd (37148)	E. Hore
Darnum Park Starbright (61269) ..	504	1.7.35	3	1	490	7,308	410	Darnum Park Starbright's Masterpiece (9383)	Brucevale Fancy Starbright (21180)	A. and W. Shearman
Springhurst Tecoma 4th (33651) ..	503	20.10.29	4	..	451	6,845	413	Starbright's Prince of Glen Ira (3345)	Tecoma of Springhurst (12225)	Devon Park Stud Farm
Avalon Starbright's Beauty (51560)	502	15.11.34	3	1	531	7,339	429	Brucevale Lord Starbright 3rd (9297)	Avalon Gladstar's Beauty 5th (36821)	F. Austin
Sleepy Valley Milkmaid (59447) ..	501	11.4.32	4	3	470	6,585	394	Holly Dell Twylish (7746)	Melview Milkmaid (29394)	A. and W. Shearman
Lucerne Vale Nemesia 2nd (62829)	501	17.9.36	4	..	487	7,357	408	Maxon Masterpiece (6755)	Lucerne Vale Master's Choice (49245)	N. C. De La Rue
Taranah Flora 3rd (69223) ..	501	5.11.36	4	..	415	6,981	389	Taranah Fair Boy (14237)	Taranah Flora 2nd (59633)	C. W. Macauley
Waratta Edna Bell (28660) ..	500	27.7.27	3	4	514	8,542	456	Jubilee Lifelight (3246) ..	Waratta Dora Bell (14274)	J. J. Desmond
Studleigh Duchess 3rd (25289) ..	500	17.2.27	4	2	449	6,514	387	Brucevale Lord 5th (3319)	Studleigh Duchess (18653)	W. H. Lyon
Coimbra Silvermine (56854) ..	499	6.2.35	4	2	492	8,790	409	Banyule Triplane (5753) ..	Banyule Silvermine 67th (28848)	H. V. Stirling
Springhurst Gamboge Tomato (55277)	499	22.5.35	4	..	500	8,358	434	Bellefaire Seaborn Successor (6824)	Springhurst Tomato 2nd (26175)	Estate of the late J. D. Read
Weir View Golden Duchess 2nd (51162)	498	14.9.34	4	2	486	8,128	415	Weir View Laddie 2nd (12328)	Weir View Golden Duchess (51161)	C. S. Walker
Rutland Brunette 10th (59354) ..	498	16.7.34	3	3	531	8,607	444	King's Vale Lauder (10792)	Rutland Brunette (29130)	S. H. Masters and Son
Kyora Dream Girl (29160) ..	497	8.9.27	3	4	517	8,164	464	Perree's Duke (Imp.) (996)	Dream Girl of Woodside (6395)	Nancarrow Bros.
Taranah Chime (55424)	497	20.12.31	4	2	483	7,118	396	Duke of Invermay (3693)	Taranah Carol (29083) ..	C. W. Macauley
Selsey Wyandotte (41949) ..	495	14.7.31	3	4	522	6,742	458	Werribee Wyandotte's King (6053)	Brucevale Lady Merribee Wyandotte (28545)	M. A. Nicholas
Springhurst Coronation Nightshade (46183)	495	17.3.32	3	3	476	7,589	426	Design's Ruler (Imp.) (7804)	Springhurst Nightshade 3rd (26170)	Estate of the late J. D. Read
Bamawm Mayflower (47101) ..	495	9.9.33	3	2	572	8,248	452	Bamawm Leon (9108) ..	Mornmoot Mascot (28555)	Estate of the late F. A. Williams
Banaview Lilac Domino 2nd (51635)	495	7.10.33	4	1	496	6,650	405	Banaview Nova (9194) ..	Clarendon Eyre Lilac Domino (39253)	J. G. Norman
Finchley Handsome Lady 2nd (43886)	494	9.3.32	3	5	559	6,731	453	Finchley Lord Harmony (8078)	Finchley Handsome Lady (37993)	T. M. Noble and Son
Taranah Flora 2nd (59633) ..	494	7.11.34	4	2	521	7,457	383	Taranah Commander (8913)	Taranah Flora (42117) ..	C. W. Macauley
Milvue Design's Honesty 2nd (63099)	492	26.8.36	4	..	452	6,889	403	Belgonia Suspense's Design (12459)	Tavistock Valerie (55444)	E. Hore
Leven Brae Gay Countess (40698)	491	16.1.28	4	5	531	8,031	396	Werribee Gaypiece (4823)	Twylish Countess of Leven Brae (16641)	E. Hore
Springhurst Blonde Nardoo (59485)	491	26.3.36	3	1	519	7,151	443	Bellefaire Seaborn Successor (6824)	Nardoo of Springhurst (18936)	Estate of the late J. D. Read
Mer Vue Choice 2nd (45131) ..	490	5.8.31	2	4	520	6,824	431	Tooravale Silver King (7699)	Wood Choice (28590) ..	F. W. Clarke

Register of Merit for Standard Herd Test. (273 Day Period of Test)—*continued.*

Name of Cow with Herd Book No.	Production Attainment (Average of Four Best Consecutive Yields).	Details to Date of Life Time. (No. age allowances.)						Details of Breeding.		Name of Owner.
		Date of Birth.	No. of Test Records.		Highest Individual Record.	Average Yield over all Lactations.		Name and H.B. No. of Sire.	Name and H.B. No. of Dam.	
	B.-fat (lb.).		Under 5 yrs.	Over 5 yrs.	Fat (lb.).	Milk (lb.).	B.-fat (lb.).			
***Jerseys*—continued.**										
Taranah Rainbow 2nd (64463) ..	490	3.10.35	4	1	514	7,158	398	Werribee Bluebell's Masterpiece (5569)	Taranah Rainbow (42118)	C. W. Macauley
Taranah Roseleaf 4th (37589) ..	489	12.10.30	1	5	525	8,385	438	Taranah Submarine (7798)	Taranah Roseleaf (23293)	E. Hore
Windrest Chevy (42529) ..	488	21.2.32	4	5	567	6,875	400	Edmonton Rairus (3936)	Chevy 13th of Melrose (11775)	Dr. A. R. Haywood
Mornmoot Modeste 2nd (33140) ..	488	15.4.30	3	4	452	6,064	379	Werribee Prince Madeira (6054)	The Falls Air Beauty (24816)	K. E. Watson
Tooravale Lassie Fowler 14th (50893)	488	25.11.32	3	2	497	7,014	428	King's Vale Monica 14th's Son (6625)	Melrose Lassie Fowler 7th (4542)	J. E. Handbury and Son
Ballara Model 6th (33837) ..	488	31.8.29	3	2	507	7,077	439	Brucevale Lord Fancy Madeira (7920)	Model of Ballara (19090)	J. O'Neill
Pine Ridge Hawthorn 2nd (63730)	488	24.8.35	3	1	504	8,781	432	Duke of the Lake (Imp.) (7805)	Banyule Hawthorn 8th (9484)	Naucarrow Bros.
Maxon Noble's Alsyke (34221) ..	487	14.3.30	4	4	508	7,785	428	Avalon Noble 8th (5389)	Alsyke 3rd of Springhurst (16960)	G. A. McNabb and Son
Brampton Standard Dream 2nd (Imp.) (56047)	487	28.9.34	3	3	507	7,426	429	Brampton Sporting Standard (Imp.) (13132)	Brampton Summer's Dream (46095)	M. A. Nicholas
Weir View Golden Design (55819)	487	23.8.35	4	1	465	7,669	412	Design's Ruler (Imp.) (7804)	Weir View Golden Duchess (51161)	J. V. Trewin
Kantara Ditny's Larkspur (29378)	485	2.10.28	3	3	479	6,856	410	Ku Ku Fashion Plate (Imp.) (3685)	Ditny of Clarendon Eyre (11651)	C. G. Smith
Ullina Heather Belle 2nd (59830)	485	11.8.34	4	2	509	7,002	416	Kyora Dream's Gadget 2nd (10815)	Ullina Heatherbelle (46542)	J. O'Neill
Rosyth Lady Tulip 3rd (38451) ..	484	29.9.29	4	4	504	7,202	414	Lord 2nd of Bruceva'e (3563)	Rosyth Tulip (21083) ..	E. J. Vagg
Maxon Bright Favourite (45055) ..	482	4.8.32	3	5	605	8,084	433	Maxon Starbright Prince 5th (8912)	Maxon Count's Favourite (37851)	G. A. McNabb and Son
Brucevale Fancy Starbright 3rd (28544)	482	15.7.28	3	4	562	7,168	444	Masterpiece of Brucevale (3824)	Fancy Starbright of Brucevale (24180)	M. A. Nicholas
Troed-Yr-Rhiw Eastern Queen (59794)	482	3.8.34	3	2	467	7,616	415	Clarendon Eyre Oxford Dreamer (10273)	Troed-Yr-Rhiw Mifanwy 2nd (37766)	E. Hore
Werribee Clementine Princess 3rd (24583)	481	15.8.26	3	3	538	7,244	423	Masterpiece (Imp.) (2394)	Werribee Island Clementine 2nd (15465)	M. A. Nicholas
Glen Leigh Duchess 4th (25791) ..	480	1.10.27	2	4	511	7,686	440	Gadabout of Danton (4480)	Duchess 10th of Kyora (6835)	J. E. Chadderton
Belgonia Peggy 18th (60543) ..	480	7.11.36	4	..	515	8,324	396	Design's Ruler (Imp.) (7804)	Belgonia Design's Peggy 13th (51702)	P. J. Maloney
Grangelea Bell (40060)	479	24.9.31	4	4	505	6,917	398	Grangelea Daffodil's Airo (7675)	Grangelea Daisy Bell (33034)	Mrs. A. A. Broad
Strathbow Goldie 16th (59521) ..	479	24.10.35	4	1	455	7,091	394	Grangelea Dapper (10655)	Strathbow Goldie 5th (26156)	F. Raggatt
King's Vale Linda 63rd (18672) ..	479	5.10.23	..	5	512	9,791	469	King's Vale Rosella's V.C. (2376)	King's Vale Linda 54th (12853)	R. G. Gay and Son
Kooreena Yo Yo (44759) ..	478	19.9.32	4	2	438	7,418	402	Columbine's Defiance of Linga Longa (4419)	Lulu 5th of Roelands (17438)	Estate of the late W. H. Hurrey
Bamawm Mistress Peggy (56238)..	478	28.8.34	3	2	519	7,739	433	Bamawm Bonnie Boy (10343)	Mornmoot Mascot (28555)	Estate of the late F. A. Williams
Elm Grove Linda (43737) ..	477	21.8.31	3	4	538	8,747	444	Gold Star of Melrose (4248)	Linda 63rd of King's Vale (18672)	R. G. Gay and Son
Finchley Lillian (57279) ..	477	27.5.33	2	3	480	6,671	444	Werribee Lord Burnham (5760)	Aveley Lillian 2nd (26199)	T. M. Noble and Son

Weir View Golden Duchess (51161)	476	2.2.33	3	4	477	8,165	407	Duke of the Lake (Imp.) (7805)	Weir View Wattle Blossom (38428)	J. V. Trewin
Maxon Sweet Estelle (54029) ..	475	8.10.34	4	1	488	6,428	390	Maxon Count Graceful (6754)	Sweet Estelle's Pansy of Boorene (11231)	G. A. McNabb and Son
Banaview Lilac Domino 4th (56240)	474	12.11.34	4	..	435	6,793	389	Banaview Silverm'ne's Sultan (10345)	Banaview Lilac Domino 4th (47105)	J. G. Norman
Rutland Bright Stockings (41918)	473	11.7.30	4	3	472	7,796	396	St. Albans Fuchsia's Superior (6115)	Lea Hurst Silk Stockings 5th (26073)	S. H. Masters and Son
Milvue Roseleaf 2nd (58468) ..	473	24.2.35	3	1	467	8,021	415	Milvue Christmas Melody (10909)	Taranah Roseleaf 4th (37589)	E. Hore
Glen Valley Waverley Lass 2nd (24405)	472	30.7.26	3	4	456	6,765	407	Rosebud's Top Note of Glen Valley (4507)	Waverley Lass 3rd of Melrose (6312)	J. A. Huffer
Milvue Twylish Bettwys (58470) ..	471	20.6.34	3	2	473	8,130	414	Milvue Christmas Melody (10909)	Troed-Yr-Rhiw Bettwys 2nd (42295)	E. Hore
Banyule Silvermine 46th (24466) ..	471	19.4.27	3	2	462	7,697	410	Wooton Airman (Imp.) (2716)	Silvermine 29th of Banyule (14195)	H. V. Stirling
Ullina Fancy Queen (69476) ..	471	23.11.36	4	..	433	6,278	387	Ballara Fancy King (8949)	Fourshells Heroine 2nd (38346)	J. O'Neill
Mer Vue Wee Doris (67915) ..	471	17.8.35	2	2	481	7,179	429	Berrington Largo (9236) ..	Wood Butterball (42574)	F. W. Clarke
Avalon Gladstar's Daisy 3rd (51558)	470	29.6.34	2	2	481	7,669	439	Avalon Gladstar 2nd (6534)	Avalon Noble's Daisy 2nd (32907)	F. Austin
Jindivick Valda's Lass (62334) ..	469	15.9.34	3	2	442	8,178	413	Somerville Master Babs (8034)	Somerville Princess Valda 2nd (38184)	O. Ronalds
Tooravale Lassie 12th (50891) ..	469	27.8.32	4	..	469	6,923	386	King's Vale Monica 14th's Son (6625)	Tooravale Lassie 5th (28731)	A. J. Turner
Tavistock Larkspur (55437) ..	468	6.11.33	3	3	521	7,173	421	Werribee Ranger (5411) ..	Tavistock May (28611) ..	E. Hore
Pine Ridge Silvermine 2nd (58999)	468	10.11.34	4	..	463	7,503	386	Duke of the Lake (Imp.) (7805)	Silvermine 27th of Banyule (11603)	Nancarrow Bros.
Lynroy Gladys 4th (62866) ..	468	11.9.35	3	1	516	6,977	397	Werribee Laverock (1985)	Lynroy Gladys (38462) ..	Vaughan Bros.
Glen Leigh Dora 2nd (28532) ..	467	7.2.29	3	3	500	7,638	446	Gadabout of Danton (4483)	Glen Leigh Duchess 2nd (15463)	J. E. Chadderton
Belgonia Design's Noella 3rd (60538)	467	13.9.36	3	1	462	7,896	411	Duke of the Lake (Imp.) (7805)	Belgonia Design's Noella (42697)	Devon Park Stud Farm
Elm Grove Silver Bell (23159) ..	466	28.8.26	3	5	478	6,576	401	Gold Star of Melrose (4248)	Silvermine of Brookside (9724)	R. G. Gay and Son
Kooreena Maranta 7th (40585) ..	466	14.9.31	3	4	471	7,102	417	Columbine's Defiance of Linga Longa (4419)	Kooreena Maranta 2nd (28775)	Estate of the late W. H. Hurrey
Sylvan Hill Linda (64410) ..	466	4.10.35	4	1	429	6,775	390	Glen Iris Bow Bells (8052)	Sylvan Hill Daisy 2nd (26361)	Smith Bros.
Glen Leigh Dawn 2nd (48264) ..	466	29.9.33	3	2	491	6,851	406	Glen Leigh Bounty (8675)	Glen Leigh Duchess 4th (25791)	J. E. Chadderton
Grangelea Roseleaf 3rd (33041) ..	465	10.9.29	3	3	481	7,439	424	Banyule Airo (5751) ..	Grangelea Rosebud 3rd (18657)	Mrs. A. A. Broad
Bamawm Princess Noella (65323)	465	1.1.36	3	1	472	7,482	407	Bamawm Master Gay Piece (11338)	Bamawm Princess Pamela (47163)	Estate of the late F. A. Williams
Kantara Jessamine 2nd (40487) ..	463	15.1.31	4	5	515	8,117	416	Glen Iris Valiant Count (6135)	Kantara Jessamine (29380)	J. H. Phillips
Tooravale May 7th (59765) ..	463	25.8.34	4	1	441	7,788	384	Tooravale Monica's Son (10121)	Tooravale May 5th (50894)	J. E. Handbury and Son
Belgonia Design's Marie 2nd (51700)	463	16.7.34	3	1	463	8,201	403	Design's Ruler (Imp.) (7804)	Belgonia Marie 4th (24491)	P. J. Maloney
Sylvan Hill Duchess (50736) ..	462	28.7.31	2	6	511	8,008	431	Somerville Heir Apparent (5460)	Duchess 4th of Goulburn (11711)	Smith Bros.
Springhurst Aniline Lily (59480) ..	462	10.9.36	4	..	468	6,946	390	Springhurst Design's Analyst (11112)	Springhurst Sybil Lily (41998)	Estate of the late J. D. Read
Bamawm Princess Pamela (47103)	461	25.9.32	3	4	537	7,141	402	Bamawm Leon (9108) ..	Avalon Gladstar Pansy (28399)	Estate of the late F. A. Williams
Wompini Starbright (60091) ..	461	25.4.34	3	2	500	6,950	419	Werribee Butter King (4802)	Kantara Starbright (40492)	T. S. Powell
Strathbow Goldie 19th (64327) ..	461	2.8.36	3	1	508	6,949	406	Grangelea Dapper (10655)	Strathbow Goldie 11th (46226)	F. Raggatt
Sylvan Hill Opal (59606) ..	460	29.7.34	4	2	498	6,618	405	Jerseyholm Handsome Boy 3rd (6766)	Sylvan Hill Jewel (29487)	Smith Bros.
Inverbroom Silver Muriel 2nd (38483)	459	17.9.30	3	6	433	8,272	377	Economist of Aveley (4522)	Avonview Muriel (23140)	W. J. Wade
Elm Grove Dawn (52626) ..	459	11.5.33	3	3	545	7,652	409	Gold Star of Melrose (4248)	Elm Grove Daphne (39640)	R. G. Gay and Son

Advanced Register of Merit for Standard Herd Test. (273 Day Period of Test)—*continued.*

Name of Cow with Herd Book No.	Production Attainment (Average of Four Best Consecutive Yields).	Details to Date of Life Time. (No. age allowances.)						Details of Breeding.		Name of Owner.
		Date of Birth.	No. of Test Records.		Highest Individual Record.	Average Yield over all Lactations.		Name and H.B. No. of Sire.	Name and H.B. No. of Dam.	
	B.-fat (lb.).		Under 5 yrs.	Over 5 yrs.	Fat (lb.).	Milk (lb.).	B.-fat (lb.).			
Jerseys—continued.										
Windrest Twinkle's Adore (64939)	459	16.1.35	3	1	471	6,409	404	Kyora Hero (11805) ..	Kyora Twinkle (49065) ..	Dr. A. R. Haywood
Kooreena Audrey 8th (49032) ..	458	17.12.33	4	2	435	5,192	372	Kooreena Carrie 3rd's Delegate (6081)	Kooreena Audrey 3rd (34099)	Estate of the late W. H. Hurrey
Warwick Augustus Marie (38486)	456	26.9.29	4	5	433	8,072	380	Chevrolet of Banyule (4443)	Boorene Augustus Marie (26295)	C. S. Walker
Maxon Noble's Goldfinch (45069)..	456	20.7.32	3	3	478	7,181	389	Avalon Noble 8th (5380)	Grangelea Goldfinch 3rd (23004)	G. A. McNabb and Son
Rutland Brunette 12th (59356) ..	456	2.8.34	3	3	487	7,972	409	King's Vale Lauder (10792)	Rutland Brunette 4th (50522)	S. H. Masters and Son
The Wattles Petal 2nd (59706) ..	455	12.9.35	4	..	453	5,614	370	Selsey Brampton Peer (12159)	Rintoul View Petal (37339)	J. H. Fadersen
Taranah Dahlia 3rd (69221) ..	455	17.8.35	4	1	411	6,263	365	Taranah Reliance (12224)	Taranah Dahlia (50772) ..	C. W. Macauley
Antimony's Trixie of Belle Vue (15569)	454	12.12.21	..	9	479	7,821	384	Columbine's Antimony (2070)	Trixie of Belle Vue (15280)	J. Moore and Co.
Coodardy Gloria 7th (Vol. 29) ..	454	10.10.33	3	3	554	7,361	410	Toorongo Belle's Bonaparte (10122)	Coodardy Gloria 3rd (37090)	P. W. Clark
Troed-Yr-Rhiw Melys 2nd (64658)	454	18.9.33	3	2	447	8,637	405	Troed-Yr-Rhiw Masterman (10130)	Troed - Yr - Rhiw Melys (26477)	E. Hore
Rutland Brunette 6th (50524) ..	453	18.8.32	4	3	407	7,109	377	Rutland Rover (10015) ..	Rutland Brunette 3rd (41919)	S. H. Masters and Son
Kooreena Audrey 7th (49031) ..	453	29.9.33	3	3	473	5,982	393	Kooreena Carrie 3rd's Delegate (6081)	Kooreena Audrey 4th (40578)	Estate of the late W. H. Hurrey
Springhurst Hussy Alsyke (50630)	453	11.6.34	3	2	447	991	489	Bellefaire Seaborn Successor (6824)	Alsyke 2nd of Springhurst (10437)	Estate of the late J. D. Read
Glen Valley Silvershine (52946) ..	452	12.9.31	4	3	420	6,578	380	Melrose Ensign (6711) ..	Silversand of Glen Valley (18756)	J. A. Huffer
Lynroy Fancy 4th (62864) ..	452	26.8.34	4	1	465	6,879	381	Werribee Laverock (9085)	Lynroy Fancy (38459) ..	Vaughan Bros.
Strathbow Goldie 11th (46226) ..	452	6.7.32	1	4	481	8,075	426	Duke of the Lake (Imp.) (7805)	Strathbow Goldie (9645)..	F. Raggatt
Vaucluse Marie Rose (64739) ..	452	1.7.34	2	2	464	7,433	422	Vaucluse Concentration (11200)	Vaucluse Tilly (37366) ..	Fairchild and Clutterbuck
Glen Leigh Daphne (48263) ..	451	6.9.34	4	2	456	7,063	381	Glen Leigh Bounty (8675)	Glen Leigh Doris 3rd (37039)	J. E. Chadderton
Belgonia Blossom 7th (29112) ..	451	2.9.27	..	5	484	8,669	433	Ariel of Banyule (4533) ..	Blossom of Belgonia (21490)	J. V. Trewin
Maxon Silver Light (58358) ..	451	26.8.35	4	1	463	5,804	385	Maxon Count Graceful (6754)	Boorene Silver Light (25542)	G. A. McNabb and Son
Sylvan Hill Joyful (50738) ..	450	18.7.32	3	5	471	7,606	404	Somerville Heir Apparent (5460)	Sylvan Hill Attractive (33760)	Smith Bros.
Maxon Chieftain's Lodestone 2nd (58347)	450	24.5.35	4	1	455	6,483	362	Maxon Chieftain (9752) ..	Maxon Count's Lodestone (40932)	G. A. McNabb and Son
Sylvan Hill Bonnie Mary (55377)	447	14.7.33	3	4	444	6,946	392	Jerseyholm Handsome Boy 3rd (6766)	Sylvan Hill Molly (42093)	Smith Bros.
Sutton Lea Airflier (38134) ..	447	15.12.29	3	4	494	6,394	403	Banyule Petalon 2nd (6185)	Golden Pariel 2nd of Boorene (11227)	W. S. Richardson
Banaview Jonquil (47104) ..	447	18.8.32	3	2	454	8,429	400	Kantara Starbright's Sultan (7867)	Kantara Jonquil (40488)	J. G. Norman

Normandie Alsyke 2nd (68357) ..	447	21.9.36	4	..	446	6,210	353	Normandie Majestic (7705)	Maxon Count's Alsyke (45056)	L. W. Colenso
Grangelea Rosella 3rd (48528) ..	446	4.8.33	3	1	453	6,857	392	Banyule Macon (6174) ..	Grangelea Rosella 2nd (40067)	Mrs. A. A. Broad
Sylvan Hill Beauty (38277) ..	445	10.8.29	2	7	435	6,017	363	Somerville Heir Apparent (5460)	Sylvan Hill Lily (21670)	Smith Bros.
Maxon Graceful Bouvardia (49426)	445	28.2.34	4	3	456	5,831	373	Maxon Count Graceful (6754)	Maxon Bright Bouvardia (37848)	G. A. McNabb and Son
Maxon Count's Lodestone (40932)	445	13.6.31	3	4	468	6,016	390	Maxon Count Graceful (6754)	Lodestone of Springhurst (21608)	G. A. McNabb and Son
Glen Leigh Destiny 2nd (43973) ..	445	19.3.33	3	4	422	6,568	388	Glen Leigh Bounty (8675)	Glen Leigh Dora (25789)	J. E. Chadderton
Ryelands Dainty Maid (64159) ..	445	24.11.35	4	1	419	7,764	363	Ryelands Black Prince (13219)	Peri Vanilla 7th (54746) ..	J. H. Phillips
Avalon Noble's Pansy 3rd (36833)	442	8.7.30	4	2	431	5,925	370	Noble of Avalon (3639) ..	Avalon Gladstar Pansy (28399)	G. A. McNabb and Son
Milvue Perree's Dainty (63103) ..	442	28.10.36	4	..	488	7,746	367	View Bank Perree's Boy (15262)	View Bank Mikado's Dainty (59881)	E. Hore
Belgonia Peggy 10th (38831) ..	441	8.9.31	3	4	520	8,260	452	Aveley Rex (6612) ..	Belgonia Peggy 6th (29117)	P. J. Maloney
Ryelands Vanilla Slice (64161) ..	441	25.5.35	3	2	446	6,777	383	Orphanage Zafferine's Prince (10985)	Peri Vanilla (18914) ..	J. H. Phillips
Selsey Great Clementine (64220) ..	441	31.7.36	4	..	446	5,613	387	Brampton Great Boy (Imp.) (9137)	Werribee Clementine Princess 3rd (24583)	M. A. Nicholas
Milvue Honesty (58462) ..	441	6.9.35	3	1	439	7,537	388	Clarendon Eyre Eminent's Lion 5th (11477)	Tavistock Valerie (55444)	E. Hore
Rutland Brunette 13th (59357) ..	440	11.8.34	3	3	425	7,264	386	King's Vale Lauder (10792)	Rutland Brunette 6th (50524)	S. H. Masters and Son
Tiny 3rd of Beverley (21097) ..	439	9.8.25	4	6	501	7,327	392	Rosella's Lad of King's Vale (3106)	Tiny of Beverley (13323)	Dr. A. R. Haywood
Elm Grove Bluebell (33355) ..	439	29.8.28	4	2	422	5,850	369	Elm Grove Royal Lad (5105)	Elm Grove Silver Bell (23159)	R. G. Gay and Son
Mornmoot Stellar Princess (45272)	439	27.10.32	3	2	428	7,334	396	Werribee Prince Madeira (6054)	Werribee Stellar Princess (37073)	T. S. Powell
Glen Leigh Doris 3rd (37039) ..	438	23.1.31	3	3	493	7,422	399	Strathkellar Top Thorn (6049)	Glen Leigh Duchess 15462)	J. E. Chadderton
Orphanage V.C. Molly (36860) ..	438	19.7.29	3	5	443	7,909	381	Wompini V.C. (4550) ..	Tavistock Molly (16240)	Ballarat Orphanage
Banyule Ishta (51650)	438	3.10.35	4	..	422	6,944	368	Banyule Pitman (9204) ..	Banyule Dea (42881) ..	H. V. Stirling
Vaucluse Daphne (51012) ..	437	20.9.32	3	1	519	6,010	387	Vaucluse Duke 3rd (10150)	Vaucluse Pansy (42368) ..	Fairchild and Clutterbuck
Elm Grove Island Queen (61464)	437	12.8.35	3	1	485	6,570	387	Werribee Island King (4717)	Elm Grove Lady Fowler (34021)	L. Nash
Jubilee Ranunculus (26186) ..	435	15.8.26	1	6	449	9,103	387	Jubilee Fanlight (4755) ..	Jubilee Rhododendron (1996)	Mrs. E. J. McKenzie and Son's
Milvue Larkspur's Attraction (58464)	435	20.8.35	3	1	502	5,982	344	Clarendon Eyre Eminent's Lion 5th (11477)	Tavistock Larkspur (55437)	E. Hore
Milvue Cariad's Suspense (63097)..	435	13.10.36	4	..	413	7,733	358	Belgonia Suspense's Design (12459)	Troed - Yr - Rhiw Cariad (23266)	E. Hore
Finchley Lillian 2nd (61608) ..	434	6.7.34	2	2	442	7,555	407	Werribee Lord Burnham (5760)	Aveley Lillian 2nd (26199)	T. M. Noble and Son
Sylvan Hill Lady Alma (38282) ..	433	31.7.29	2	8	500	7,167	381	Somerville Heir Apparent (5460)	Sylvan Hill Alma (23444)	Smith Bros.
Maxon Bright Clara (54013) ..	432	11.9.34	4	2	451	6,521	371	Maxon Starbright's Prince 5th (8912)	Maxon Noble's Clara (34222)	G. A. McNabb and Son
Sylvan Hill Handsome Girl (33762)	431	27.7.28	2	8	450	6,505	404	Jerseyholm Handsome Boy 3rd (6766)	Sylvan Hill Starbright (23447)	Smith Bros.
Jerseyholm Empress 22nd (37506)	431	23.7.30	2	6	419	7,073	350	Brucevale Lord Island Fancy (4500)	Jerseyholm Empress 4th (13356)	T. Harvey
Maxon Count's Ranunculus (58352)	430	29.11.34	3	2	423	8,053	481	Maxon Count Graceful (6754)	Springhurst (Ranunculus 2nd (18937)	G. A. McNabb and Son
Maxon Count's Favourite 4th (62999)	430	18.9.36	4	..	417	5,390	354	Maxon Count Graceful (6754)	Maxon Mercedes Favourite (45064)	G. A. McNabb and Son
Banyarra Attraction 6th (70182)..	430	16.9.36	4	..	449	5,777	362	Banyule Worcester (11349)	Banyarra Attraction 3rd (4114)	I. R. Anderson
Maxon Count's Favourite 3rd (58351)	429	15.9.35	4	..	471	6,480	356	Maxon Count Graceful (6754)	Maxon Bright Favourite (45055)	G. A. McNabb and Son
The Wattles Hazel 2nd (55512) ..	428	22.9.34	3	2	421	7,126	366	Woodside Crissy's Gamboge (71251)	Jubilee Witch Hazel (18940)	N. H. Enders

Advanced Register of Merit for Standard Herd Test. (273 Day Period of Test)—*continued.*

Name of Cow with Herd Book No.	Production Attainment (Average of Four Best Consecutive Yields).	Details to Date of Life Time. (No. age allowances.)						Details of Breeding.		Name of Owner.
		Date of Birth.	No. of Test Records.		Highest Individual Record.	Average Yield over all Lactations.		Name and H.B. No. of Sire.	Name and H.B. No. of Dam.	
	B.-fat (lb.).		Under 5 yrs.	Over 5 yrs.	Fat (lb.).	Milk (lb.).	B.-fat (lb.).			
***Jerseys*—continued.**										
Bonnay Amanda's Doris (51865) ..	427	19.9.33	3	2	402	7,309	359	Jersey Inn Edith's Masterpiece (9082)	Bonnay Lady's Amanda (38075)	E. J. Vagg
Olivedale Buttercup (37381) ..	426	3.6.29	3	3	395	6,290	368	Studleigh Dandy (5435) ..	Olivedale Creamy (18467)	W. H. Lyon
Sylvan Hill Countess (38278) ..	425	20.7.29	2	6	443	7,055	365	Somerville Heir Apparent (5460)	Duchess 4th of Goulburn (11711)	Smith Bros.
Orphanage Pearl 5th (41409) ..	425	19.8.31	1	5	445	7,568	395	Orphanage Quicksand's Prince (7647)	Orphanage Pearl 2nd (41408)	Ballarat Orphanage
Sylvan Hill Charm (46300) ..	424	22.7.31	3	5	432	7,493	379	Somerville Heir Apparent (5460)	Sylvan Hill Attractive (33760)	Smith Bros.
Ullina Heather (64692)	424	21.10.35	4	..	463	6,343	364	Ballara Fancy King (8949)	Strathbow Heather Bell (29326)	J. O'Neill
Grangelea Rosella (33042) ..	424	29.8.29	3	1	418	6,610	372	Banyule Airo (5751) ..	Grangelea Rosebud 4th (26393)	Mrs. A. A. Broad
Windrest Rose Marie 2nd (74581)	423	14.9.36	4	..	466	5,625	357	Windrest Prince Madeira (14303)	Aberdour Rance (23510) ..	Dr. A. R. Haywood
Milvue Tiny Rosebud (58469) ..	423	15.11.35	4	..	356	6,619	345	Milvue Bettwys Master (12955)	Milvue Roseleaf (45181) ..	E. Hore
Belgonia Gem's Noella (42922) ..	422	16.8.32	3	2	552	9,256	461	Duke of the Lake (Imp.) (7805)	Gem's Noella (Imp.) (33497)	P. J. Maloney
Sylvan Hill Handsome Bell (64407)	422	2.10.35	4	1	449	5,395	341	Glen Iris Bow Bells (8052)	Sylvan Hill Handsome Girl (33762)	Smith Bros.
Elm Grove Lady Loch 2nd (52628)	422	17.9.33	3	2	451	7,446	379	Goldstar of Melrose (4248)	Elm Grove Lady Loch (39642)	R. G. Gay and Son
Wattle Vale Modesty (21203) ..	420	10.4.25	4	2	480	6,666	356	Duke of Melrose (2971) ..	Wattle Vale Pride (9272)	D. E. Cook
Jubilee Rowan (38128)	420	18.1.30	3	3	405	7,084	357	Jubilee Whatlight (4861)	Jubilee Rhododendron (19946)	M. A. Nicholas
Irona Dreaming Cobra (67117) ..	420	20.2.37	4	..	432	5,894	346	Dreamer's Hamptonne Star (Imp) (12384)	Navua Cobra's Lass (55409)	E. Fraser Parkes
Rosyth Gay Grevillea (55120) ..	418	31.7.33	3	3	489	7,222	370	Werribee Gaypiece (4823)	Rosyth Grevillea (46068)	Mrs. N. B. Alston and Sons
Bonnay Phyllis (38978)	417	25.7.30	3	4	449	6,881	370	Welbourne Handsome Boy (5573)	Phyllis of Queensvale (19964)	E. J. Vagg
Vaucluse Princess (55699) ..	416	18.9.34	4	1	429	6,059	342	Paisley Master (12009) ..	Vaucluse Empress 3rd (51013)	Fairchild and Clutterbuck
Selsey Roseleaf 3rd (59413) ..	416	8.10.35	4	..	427	6,405	342	Brampton Great Boy (Imp.) (9137)	Jubilee Roseleaf (33668) ..	M. A. Nicholas
Carellen Fancy Clementine (65374)	416	26.8.36	3	1	427	7,824	399	Wompini Vagabond King (14312)	Wompini Anna Carlovna (60084)	T. S. Powell
Normandie Mayflower 6th (45473)	415	28.4.32	3	3	457	7,519	378	Normandie Majestic (7705)	Normandie Mayflower 4th (33194)	L. W. R. Colenso
Maxon Count's Lodestone 2nd (54020)	413	25.8.34	3	2	522	6,546	379	Maxon Count Graceful (6754)	Lodestone of Springhurst (21608)	G. A. McNabb and Son
Maxon Mercedes Ranunculus (45067)	412	27.9.32	4	3	394	5,728	340	Maxon Mercedes Chief 4th (8063)	Ranunculus 2nd of Springhurst (18037)	G. A. McNabb and Son
Normandie Golden Nancy (49868)	412	7.8.33	3	3	538	6,725	369	Normandie Golden Peer (9860)	Nancy 4th of Somerset (17401)	L. W. R. Colenso
Glen Iris Golden Design (52816) ..	411	6.9.35	3	2	442	7,086	368	Design's Golden Oxford (Imp.) (11280)	Glen Iris Design's Finesse (43966)	C. S. Walker
Stonybank Snowdrop 2nd (50656)	410	25.8.33	1	3	497	6,774	424	Melrose Curio (6887) ..	Snowdrop 3rd of Dalebank (16799)	W. G. Tait

Sylvan Hill Larkspur (69190) ..	410	13.10.36	4	..	360	5,103	336	Glen Iris Bow Bells (8052)	Sylvan Hill Primrose (38284)	Smith Bros.
Jubilee Myrtle (33665)	409	25.5.28	2	5	421	6,896	360	Jubilee Whatlight (4861)	Jubilee Marigold (23391)	M. A. Nicholas
Milvue Oxford's Queen (63102) ..	409	7.8.36	4	..	445	6,105	341	Belgonia Suspense's Design (12459)	Troed-Yr-Rhiw Eastern Queen (59704)	E. Hore
Maxon Count's Alsyke 4th (58348)	409	21.8.35	3	1	427	5,552	344	Maxon Count Graceful (6754)	Maxon Bright Alsyke (37846)	G. A. McNabb and Son
Grangelea Rosebud 3rd (180651) ..	408	17.8.24	1	5	426	8,128	390	Golden Twylish (1017) ..	Rosebud 2nd of Grangelea (14132)	Mrs. A. A. Broad
Elmwood Merry Lark (57189) .	408	9.2.33	2	4	416	6,577	376	Austral Valley Lord Larkspur (8832)	Elmwood Merry Girl (37572)	J. J. Coulthard
Jubilee Ricious (38344) ..	407	12.9.30	4	3	388	6,198	330	Jubilee Wheaten Light (6133)	Jubilee Roseleaf (33668) ..	M. A. Nicholas
Fourshell's Yvette (38349) ..	406	29.6.30	2	5	490	7,526	405	Belgonia Propeller (5776)	Boveagh Yvatte (29512) ..	J. O'Neill
Normandie Hawthorn 4th (45471)	406	17.9.32	3	2	383	5,981	323	Peer of Lewisham (4483)	Hawthorn 2nd of Belmont (18667)	L. W. R. Colenso
Maxon Count's Ranunculus 2nd (58353)	406	28.8.35	4	1	436	5,391	348	Maxon Count Graceful (6754)	Maxon Mercedes Ranunculus (45067)	G. A. McNabb and Son
Maxon Graceful Duchess 2nd (49427)	404	6.6.33	3	3	478	5,948	375	Maxon Count Graceful (6754)	Graceful Duchess 25th of Melrose (11778)	G. A. McNabb and Son
Sylvan Hill Buttercup (46299) ..	403	30.7.31	2	6	423	6,556	375	Somerville Heir Apparent (5460)	Sylvan Hill Daisy (21669)	Smith Bros.
Inverbroom Molly's Bunty (57762)	403	3.5.35	3	1	408	6,848	355	Grangelea Butter Boy 3rd (10653)	Inverbroom Silver Molly (40289)	W. J. Wade
Brookfield Rosalind 22nd (47445)	401	26.8.32	2	4	429	6,755	382	Brookfield Ewell (5141) ..	Brookfield Rosalind 5th (15589)	J. J. Coulthard
Elm Grove Dairymaid 2nd (43735)	401	5.9.31	3	3	432	6,649	368	Warenda Ragtime Dominant (8007)	Elm Grove Dairymaid (25899)	R. G. Gay and Son
Walamba Lady (64779)	401	21.7.34	4	2	422	5,646	325	Banyule Airo (5751) ..	Jubilee Laconia (44531) ..	J. J. Coulthard
Clarendon Eyre Camille 11th (56799)	401	6.12.34	3	2	477	6,506	336	Victorious Pioneer (Imp.) (7964)	Clarendon Eyre Camille 5th (43379)	J. Moore and Co.
Sylvan Hill Beauty 2nd (64403) ..	401	13.10.35	4	1	365	5,739	338	Glen Iris Bow Bell (8052)	Sylvan Hill Beauty (38277)	Smith Bros.

RED POLLS.

Victoria Volt (4049B)	514	24.7.31	3	5	537	10,070	444	Victoria Vice Captain (1267A)	Victoria Eructation (3226C)	State Research Farm
Victoria Kinetica (4889A) ..	479	15.10.33	1	3	525	10,973	469	Victoria Gallant (1481AA)	Victoria Volt (4049B) ..	State Research Farm
Victoria Maid Marion (5690AA) ..	462	25.6.34	3	2	445	8,681	394	Woodburn Peter Pan (1504AA)	Victoria Village Belle (1522AA)	State Research Farm
Maryville Eve (2506C)	448	27.9.28	3	7	525	9,154	422	Victoria King Bird (940A)	Scotia (525D)	F. T. Butcher
Maryville Elva (3722A)	446	17.2.33	4	2	437	7,921	356	Victoria King Bird (940A)	Maryville Ena (3135B) ..	F. T. Butcher
Maryville Jean (6206D) ..	417	20.10.35	4	1	386	8,075	340	Chandpara Ferdinand (1779AA)	Maryville Alice (—) ..	F. T. Butcher
Maryville Ella (5898A)	413	30.11.35	4	1	444	8,010	352	Chandpara Ferdinand (1779AA)	Maryville Etta (5049) ..	F. T. Butcher
Victoria Eructation (3226C) ..	405	19.3.29	4	4	395	8,057	357	Victoria Volcano (322A) ..	Victoria Cutty (490D) ..	State Research Farm

A Cheap Ration for The Dairy Cow

A cheap ration for dairy cows is one consisting of flax-boll chaff, malt coombings, crushed barley and a good quality meatmeal. Where little or no grazing is available a milking cow should receive two full kerosene tins of flax-boll chaff daily in addition to four pounds of the following concentrate mixture for each gallon of milk produced. One bag or approximately 60 lb. of malt coombings, one bag or approximately 140 lb. of crushed barley, 14 lb. of meatmeal, 2 lb. of ground limestone and 2 lb. of salt.

The feeder will have to increase or decrease the quantities fed to each cow in accordance with the cow's individual appetite and decrease it in proportion to the paddock feed available.

Flax-boll chaff should be obtained direct from the nearest flax mill, malt coombings from the maltsters, barley from the Australian Barley Board and meatmeal from one of the leading manufacturers. If possible, full truck lots should be obtained to reduce freight and the barley should be ground at home.

Certified Pullorum-free Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

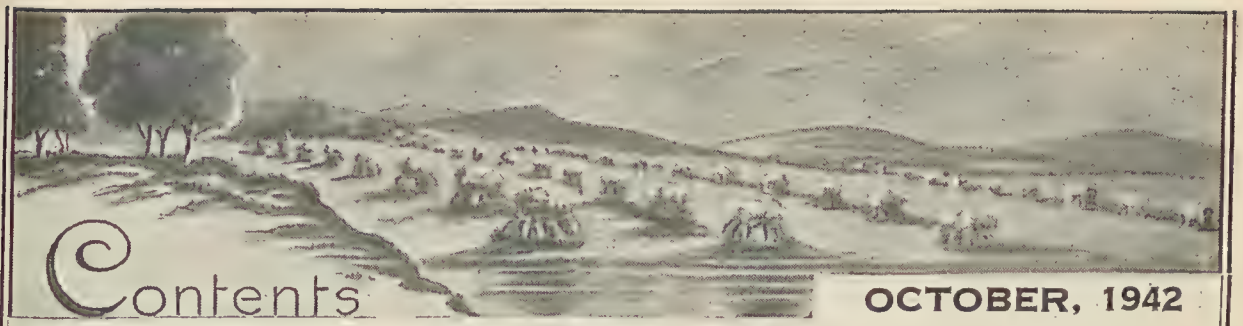
Owner.	Date of Certification.	Number of Birds.
Reformatory Prison, Castlemaine	6.3.42	200
"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26.3.42	927
Stewart, J. A., Castlemaine	22.4.42	592
Rushton's Electric Hatcheries, (J. Rushton), Shepparton	28.4.42	653
Christie, R. R., and Son, Bentleigh	1.5.42	719
Becker, F. W., Cheltenham	1.5.42	315
Kostos, D., cr. Collins and Waverley roads	11.5.42	801
Evans, R., 50 Simpson-street, Kyneton	11.5.42	35
Throup, R. E., Neerim South	11.5.42	200
Berry, R., Campbell's Creek	11.5.42	87
Flack, Mrs. Florence, Horsham	11.5.42	100
Need, H. G., Warragul	15.5.42	254
Smith, R. Harcourt	15.5.42	97
Dookie Agricultural College, Dookie	19.5.42	447
Pettigrove, D. N., Kennington, via Bendigo	19.5.42	558
Wohlers, S., Jung	21.5.42	139
Throup, N. C., Neerim South	21.5.42	67
Mair, W. P., Tyabb	21.5.42	38
Horsfall, J. B., Lower Templestowe	26.5.42	720
Smith, F., Terang	1.6.42	947
San Miguel, Mrs. M. H., Box Hill	1.6.42	1,503
Rae, J., Sebastopol	1.6.42	1,497
Bartlett, O. E., Pimpinio	1.6.42	228
Cakebread, H., Shady Creek, via Buln Buln	3.6.42	112
Simpson, G. D., Tally Ho	3.6.42	680
Clark, H. N. Croydon	8.6.42	1,631
Abernethy, F. J., Horsham	8.6.42	368
Heath, A. L., Spring Vale	8.6.42	130
Lowe, L. S., Bayswater	8.6.42	241
Youl, R. S., Wedderburn	8.6.42	757
Hewett, A., Bayswater	8.6.42	247
Thomas, Mrs. J., Outtrim	8.6.42	100
Barnes, J. H., Blackburn	8.6.42	978
Wimhurst, C. J., Tongala	8.6.42	417
Williams, V. (Wangaratta Hatchery), 91 Tone-road, Wangaratta	12.6.42	568
Kosch, E. W., Minyip	12.6.42	343
Mumford, L. J., Healesville	12.6.42	252
Broadbent, C. A., Yarraberb, via Derby	12.6.42	193
Massie, G., Shepparton	12.6.42	1,309
Shipp, R., Kerang	12.6.42	375
Hopkins, C. A., Shepparton	12.6.42	1,348
Hunt, R. R., Burwood	19.6.42	300
Henderson, C. W., Shepparton East	22.6.42	247
Mitchell, B., Kangaroo Flat	22.6.42	793
Gwyther, R. P., Highton, via Geelong	22.6.42	206
Hayes, R., Montrose	26.6.42	188
Sloan, G. J., Bayswater	26.6.42	191
Everard, H. L., Hawkesdale	30.6.42	321
Ridgway, G., Noble Park	30.6.42	76
Stephenson, Mrs. K., Research	2.7.42	93
Jones, M. A., Ringwood	2.7.42	283
Major, W. R., Girgarre	2.7.42	88
Walters, Mrs. V., Lower Templestowe	2.7.42	44
Grenville Stud Poultry Farm, Springvale South	2.7.42	1,640
Coupar, J. E., Nathalia	2.7.42	487
Clegg, R. M., Hamilton	7.7.42	14
Mackintosh, Walter C., Neerim South	8.7.42	194
Hurst, H., Eltham	9.7.42	913
Jackson, C. and H., Carrum Downs	9.7.42	94
Webb, A. E. H., Cranbourne	13.7.42	1,541
Scouller, R. C., Cobden	13.7.42	100
Gibbs, A. E., Stanhope	15.7.42	623
Abikhair and Tacey, Heidelberg	15.7.42	538
All Red Poultry Farm (E. M. Nichols), Yan Yean	15.7.42	460
Peck, D., Tally Ho	15.7.42	275
Pearse, Mrs. H. F., Donald	22.7.42	232
Hockley, N., Hamilton	22.7.42	22
Everist, F. R., Tyabb	29.7.42	40
Lumsden, R. G., Ballarat	1.8.42	11
Greenwood, J., Forest Hill	1.8.42	346
Bassett, R. A., South Muckleford	4.8.42	114
State Research Farm, Werribee	11.8.42	380
Hines, W. and C. A., Traymer's Lagoon, via St. Arnaud	12.8.42	1,096

Book Review

Animal Breeding and the Maintenance and Training of Sheep Dogs, by R. B. Kelley, D.V.Sc., Animal Geneticist, Council for Scientific and Industrial Research; Officer-in-Charge, F. D. McMaster Field Station; President New South Wales Working Sheep Dog Society. (Sydney: Angus and Robertson Ltd., 169 pages, 10s. net.)

In the first part, the writer explains in simple terms the genetical, physiological, and, to some extent, the morphological aspects of dog breeding. Knowledge gained from the inheritance and transmission of characters with other domestic animals is referred to in practical terms, and an interesting chapter is included dealing with the application of breeding plans to sheep and other domestic animals. The chapters dealing with the treatment of bitches during heat, pregnancy, whelping and suckling, and the rearing, feeding, housing, and common ailments of sheep dogs contain good practical information that every sheep-dog owner should know.

The second part of the book is devoted to the training of sheep dogs, and the different uses for which they are bred, and concludes with a description of the principal sheep-dog trials in New Zealand, Victoria, and New South Wales.



Contents

OCTOBER, 1942

		PAGE
Organizing Rural Industry for War Production	*H. A. Mullett, B.Agr.Sc.*	497
Wartime Demand for Pig Meats	*L. A. Downey, H.D.A.*	499
The Importance of Pasture for Pigs	*N. C. Killeen, B.Agr.Sc., and S. H. Edwards*	502
Still More Potatoes are Needed	*W. J. B. McDonald, B.Agr.Sc.*	504
Grub Injury to Pastures	*R. L. Twentyman, B.Agr.Sc., and R. T. M. Pescott, M.Agr.Sc., F.R.E.S.*	506
Inland Killing—New Bill Introduced		511
Soil Drift Control—Results of Competition	*H. Hanslow*	513
Research Barley—A New Variety	*A. R. Raw, M.Agr.Sc.*	521
Economy in the Use of Veterinary Preparations		524
School of Dairy Technology and Dairy Research Institute Annual Report	*T. M. Jensen B.Agr.Sc. (N.Z.)*	525
The Fertilizers Act—Analyses of Samples—Season 1941	*W. C. Robertson*	533
Dairying Without Mud	*L. A. Mahony and E. Crowley*	536
Blackleg in Cattle	*G. Nicol, B.V.Sc.*	539
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	541
Burnley Egg-laying Competition—Results of Winter Test	*H. F. Clinton*	545
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	547
Garden Notes	*J. L. Provan, B.Agr.Sc.*	548
Pullorum-free Flocks (Poultry)		550
Tubercle-free Herds (Dairy Cattle)		551

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

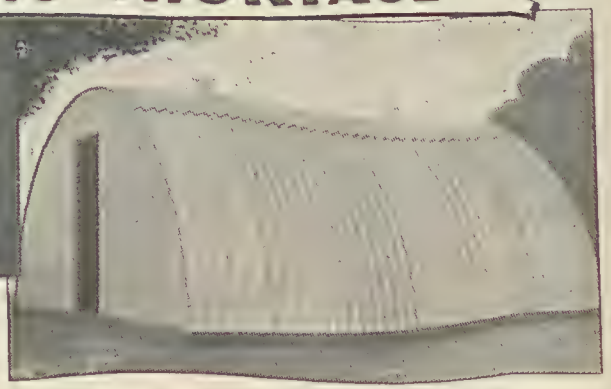
POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions 2½d.; to U.S.A. and Foreign Countries, 3½d.

FARM HOUSING SHORTAGE

solved by the new

JHARCO CABINS



The latest development in the use of Hardie's Fibrolite Asbestos Cement materials is the new Jharco Cabin. Its construction eliminates all unnecessary timbering by the use of three curved self-supporting corrugated Fibrolite Sheets bolted at the joints. As illustrated these cabins are ideal for the housing of land-army workers as well as providing additional simple and economical farm buildings.

HARDIE'S GENUINE FIBROLITE

ASBESTOS CEMENT BUILDING MATERIALS

INDEX TO ADVERTISEMENTS

FRONT SECTION

Blyth Chemicals Ltd. iv

General Motors-Holden's Pty. Ltd. ... opp. p. 517

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi

Hardie James & Co. Pty. Ltd. ii

H. V. McKay Massey Harris Pty. Ltd. ... iii

International Harvester Coy. of Australia Pty. Ltd. v

Law Somner Pty. Ltd. (Seeds) ... opp. p. 516

Leggo, Victor, & Farmers Ltd. ... inside cover

State Savings Bank iv

BACK SECTION

Australian Barley Board (Barley Prices) vii

Australian Cement Ltd. ... ... inside cover

Cockbill, J. vii

Commonwealth Serum Laboratories outside cover

Joyce, A. & Co. Pty. Ltd. vii

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 533

Nightingale, A. G. & Co. (Nursery Stock for sale) ix

Shell Co. of Australia Ltd. ... opp. p. 532

Trewhella Bros. Pty. Ltd. ix

Trinca Stud Poultry Farm ix

Victorian Railways viii

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) viii

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Organizing Rural Industry for War Production

District War Agricultural Committees

By H. A. MULLETT, B.Agr.Sc., Director of Agriculture

THE entry of Japan into the war, followed by increased enlistments in the Australian Armed Forces, the arrival of American troops in this country, and the steady expansion of the munition industries, has decreased the man power available for rural production, and in many other ways, of which the farmer is well aware, has reduced his capacity to produce. This has made it necessary to provide machinery to ensure that the man power remaining in the industries is used to the best advantage, to restore it to the extent necessary where production is vital, and generally to bring the nation's food production effort to a higher degree of efficiency.

The Australian Food Council has determined how much food is required for the Armed Forces, the civilian population, and export to Great Britain. Production targets for the priority crops have been drawn up and allocations have been made to each State. War Agricultural Committees, under the chairmanship of officers of the Department of Agriculture, are being set up in the principal rural districts of the State for the purpose of assisting in obtaining the production quota.

Owing to the pressing military requirements, the rural community will have to depend to a much greater degree this year on labour other than that released from the Armed Forces. The Committees therefore will also assist in organizing to the best advantage the labour still in the industry, in obtaining additional labour when this is essential to the war effort, and in arranging for the more efficient use of trucks and farm machinery generally.

In Victoria seventeen Regional District Committees are being set up, each under the chairmanship of an officer of the Department of Agriculture. Each committee will consist of five members and will include representatives of the farming and business community.

Each Regional Committee will be assisted by local advisory committees within the region.

The Regional Districts, together with the headquarters, are set out below:—

Names of Regions and Headquarters.

1. Mildura Irrigation (Mildura).
2. Mallee (Res. Stn., Walpeup).
3. Wimmera (Horsham).
4. Hamilton (Hamilton).
5. Camperdown-Port Fairy (Camperdown).
6. Colac-Geelong (Colac).
7. Western Central (Melbourne).

The headquarters of each Regional District are shown in the map.

8. Ballarat (Ballarat).
9. Bendigo (Bendigo).
10. Kerang-Swan Hill Irrigation (Kerang).
11. Goulburn Valley (Shepparton).
12. Yarrawonga-Upper Murray (Experiment Farm, Rutherglen).
13. North-Eastern (Benalla).
14. Eastern Central (Melbourne).
15. Central Gippsland (Drouin).
16. South Gippsland (Leongatha).
17. East Gippsland (Bairnsdale).

Flax, sugar beet, and vegetable seeds, potatoes and vegetables are urgently needed in increasing quantities and are high in priority as compared with most other forms of production. Special contracts and arrangements have been made in many cases with farmers for these crops, and drives for increased production, such as are now being conducted by the Department for a 50 per cent. increase in the potato acreage, have met with a ready response from many farmers, but more beet sugar is urgently needed.

The loss of much of Britain's normal supply of vegetable oils, in recent months, has caused her to increase the quantities of butter-fat from Australia. Much cheese also is needed. Preference of the American forces for beef and pigmeats has resulted in a shortage of these products, and consequently the production targets for these are well above normal figures of recent years.

The committees will assist in solving a number of urgent problems, but there is none so urgent as conserving the maximum tonnage of hay, particularly grass hay, from the present bountiful pasture growth in the dairy and fat lamb areas of the State. There was never a better season, and, if maximum benefit is to be obtained from it, best use must be made of the men available for this work, for, few as they are, it is not likely that there will be more available for the duration of the war. National production next year and the year after depends on getting this hay harvest in. The committees will endeavour to arrange for every press and baling plant to work to full capacity and supplement this by keeping every man and every hayrake working to maximum capacity.

WARTIME DEMAND FOR PIG MEATS

Efficiency Counts in Production

By L. A. DOWNEY, H.D.A., Pig Expert

A plump litter of Berkshires which should easily make the goal of 250 lb. live weight at 8 weeks old.

INCREASED pig production is urgently required. It can be achieved either by increasing the extent of operations, i.e., by increasing the number of breeding sows, equipment, food supply, and labour, or by increasing efficiency in present operations. This latter method will give the best net return to the individual farmer raising pigs and to the nation.

By better management and use of present stock, materials, food, and labour, more pig meats can be produced to meet the nation's requirements without the pig industry calling on materials, transport, and labour which are required for other purposes.

The object should be to locate and then eliminate waste which is very considerable in the pig industry. Such an achievement will have a more permanent value to pig raisers and to the national economy, than will increased pig production brought about by breeding more pigs, but lowering efficiency in production and thus raising costs.

It is even possible that in some cases fewer breeding sows, well managed, will produce a greater quantity of marketable pig meat than present numbers which constitute over-stocking and under-feeding.

There are over 20,000 pig-raisers in Victoria, and if each one will give careful consideration to his pig-raising operations, most will admit that they are not getting the best possible output from their pigs. The following points will give farmers a lead in the location of waste and the procedure necessary to reduce it. Even under present conditions of labour shortage on farms, these suggestions will be found practicable and profitable in most cases.

It is believed that, for each breeding sow in use, only ten pigs are marketed each year, but that figure is too low. If the number of pigs marketed per sow were increased to twelve per year, it would give a net increase of 20 per cent. to the farmer's income and to the nation's supply of pig meats, because those two extra pigs could be reared with the food, equipment, and labour which is not being fully utilized.

The waste can be classified as occurring: (1) on keeping those brood sows which do not produce two good litters a year; (2) on those pigs which die between birth and marketing; and (3) on those pigs which grow too slowly to marketable size.

In the first-mentioned class, there are many sows which have a much longer period than six months between their consecutive litters. They are wasting food, equipment, and labour all the time they are out of production.

The reasons for this class of waste include the lack of supervision of matings and deficiencies in either quantity or quality of the diet of the sows or the boar.

The number, size, and vitality of the pigs born in each litter are affected by the breeding capacity of the breeding stock and by the feeding which they are subjected to.

The second class of waste is most obvious, for it is well known that at least 25 per cent. of the pigs born do not survive to weaning age. Losses in young suckling pigs are due to many causes, but the main cause is lack of size and vitality in the pigs at birth, which increases their vulnerability to the many dangers and reduces their chance of survival. Pigs weighing 3 lb. at birth have a much better chance in the race to market than those weighing 2 lb. at birth. The remedy is in adequate feeding of the sow during pregnancy.

The provision of fresh pasture runs for sows with litters reduces loss of young pigs through disease.

The deaths of pigs after weaning are not so numerous, but are nearly as wasteful because the pigs are larger and more valuable. These deaths after weaning are due mainly to diseases which are usually associated with poor feeding or bad sanitation, both of which are preventable.

The third class of waste, that caused by slow growth, is not so obvious, but is, nevertheless, serious.

The availability of foods affects feeding practices, but generally it is economical to fully feed pigs. About half the food a pig can eat is used just to maintain the pig at its weight; the other half is used to make gains in weight; therefore every day saved in the growth of a pig saves the food required to maintain the pig for one day. Growth rate is affected by the inherent size of pigs, their food supply and their health.

Large breeding stock produce faster-growing pigs than do smaller breeding stock.

The growth rate of sucking pigs is largely dependent on the milking capacity of their mothers. This varies considerably, and by selection based on records it is possible to obtain a herd of heavy milking sows. Sows' capacity to milk is, of course, affected by the feeding they receive before and after farrowing. Sows should always be well fed, and they should receive as much as they can consume after their litters are one week old, being given three meals daily, or access to self-feeders and drinking water or separated milk.

Full feeding is necessary for pigs to make 200 lb. live weight at 200 days old.

The quality of these pigs reflects good breeding, feeding, and management.

By providing supplementary food in creeps, which are accessible to the suckers, but not to the sows, pigs over three weeks old can be encouraged to eat more and grow more rapidly than if they were dependent on the sow's milk and what they may be able to obtain from the sow's trough. The supplementary food should be grain, preferably dry, and either separated milk or meatmeal. If separated milk is not available, drinking water should be provided.

The objective should be to produce litters averaging 250 lb. or more at eight weeks old. Many litters weigh less than 200 lb., but litter weights of 400 lb. are within the reach of all. Heavy weaner weights lead to rapid growth in later life.

Full feeding until the pigs reach marketable condition is usually sound practice. The growth rate objective should be 200 lb. live weight pigs at 200 days old.

To sum up, it is efficiency that counts more than the size of operations.

Let the goals be: Two litters a year per sow; 3 lb. pigs at birth; 250 lb. litters at 8 weeks old, and baconers 200 lb. live weight at 200 days old.

To check up on performances, keep records of services, farrowings, weanings, and marketings on cards obtainable free of charge from the Department of Agriculture, Melbourne, C.2.

To achieve the goals, use large and productive breeding stock; feed an ample and balanced diet—grain and pasture with either separated milk or meatmeal provide a satisfactory balance of diet; keep pigs on fresh pasture or in clean pens, giving the youngest pigs the cleanest ground; and keep pigs free of lice, mange, and worms. Don't let these parasites rob you of your reward.

Scabby Mouth in Sheep and Lambs.

In cases of scabby mouth there is a formation of ulcers which later develop into crusts or scabs. The most common seat of the ulceration is in the region of the lips and nose. In severe cases ulcers are present on the membrane inside the mouth. Coronets also may be affected as well as the udders of ewes rearing affected lambs.

The disease is due to a virus, but the lesions are usually invaded later by other organisms, such as necrosis bacilli. Infection takes place through some slight skin injury caused by grazing on dry pastures, or by thistles.

As the disease is infectious, affected animals should be isolated immediately.

In mild cases wash affected parts with 1 per cent. Lysol, Monsol, or Dettol (one tablespoonful to 2½ pints of water) and remove scabs.

Then apply the following ointment:—

Monsol or Dettol ..	5 parts
Sulphur	10 parts
Lard or vaseline ..	100 parts

If possible, repeat three times a week.

In severe cases wash as before, then paint with tincture of iodine and later dust with a powder containing boric acid 2 parts, and chloride of lime 1 part.

Repeat as often as practicable.

The Importance of Pasture for Pigs

Experiments at Rutherglen Experiment Farm

By N. C. KILLEEN, B.Agr.Sc., Science Field Officer, and S. H. EDWARDS, Field Assistant

THERE is much difference of opinion among pig farmers as to whether raising pigs in pens is superior to raising them in paddocks with pasture. The following, based on experimental records and observations at Rutherglen Experiment Farm, is a discussion of the advantages of raising pigs by the paddock method, and the necessity of green herbage for swine.

Greatest advantage of the paddock system is derived from the benefit accruing to the pigs because of the addition of pasture to their diet, but, apart from that, labour is saved where there is no regular cleaning of pens and, where the number of pigs carried is high, the need for a large capital outlay on pens is avoided.

The benefit obtained by the pigs will depend on the nature and amount of pasture available. If large quantities of good leguminous pasture are supplied, it will serve to replace a small part of grain and other concentrates in the diet, but, if only small quantities are available, benefits will be derived mainly from the presence in pasture of proteins and vitamins, which are not sufficient in the ordinary pig feeds.

Rations fed to swine often consist of a grain, such as wheat or barley (or a by-product such as pollard), plus a protein supplement. The quality of protein in this supplement varies from a biological point of view, and in some supplements, such as milk, the quality is high, giving a high growth rate when fed to the animal with a requisite amount of grain.

In other supplements, such as meatmeal, the quality is lower and the growth rate is less than with pigs fed a milk ration. The addition of proteins present in the pasture to such a diet tends to make up for the deficiency of the protein supplement, and to promote a more rapid growth.

Even more important is the supply of certain vitamins, which do not occur in other constituents of the pig's diet, and which are essential to the animal's well-being. Chief vitamins required by swine and supplied by green plants are vitamins A and D. The latter, however, is synthesized in the animal's body under exposure to sunlight, and hence, under Australian conditions, where abundant sunlight is available, its deficiency is not imporant. Vitamin A, however, is supplied only in the diet, and it is probable that deficiency of this vitamin is fairly common in Victorian piggeries.

Vitamin A deficiency in swine is manifest by a cessation or a check of growth, nervous disorders, such as twitching and spasms, and inability to walk properly, caused by incoordination of the use of the legs. These are more or less acute symptoms, and show more commonly in very young pigs. In older animals, vitamin A deficiency causes sterility of both sows and boars, particularly the latter, and results in sows continually returning to the boar. This probably constitutes the most serious and most common symptom of deficiency occurring in Victoria. In pigs of all ages resistance to disease is lowered, usually resulting in increased incidence of pneumonia.

Although pigs are reared in paddocks at Rutherglen, most of the symptoms outlined herein have been noted under experimental conditions there during the dry autumn months when no pasture is available. Acute symptoms, such as nervous disorders, were manifest only in suckers, but sterility of breeding stock has been a noted feature where sows and boar have been deprived of pasture. The vitamin can be stored in the body to a certain extent, and provided pasture has been available prior to summer months, these reserves will prevent deficiency symptoms becoming obvious in store pigs. However, with brood sows, where demands are greater than normal, the deficiency will become apparent in very young suckers, whose only source of the vitamin is the mother's milk.

It can be seen, therefore, that in piggeries where the animals are not run on pasture, and in all piggeries during the dry months, alternative supplies of the vitamin are necessary. Apart from green plants, the vitamin is present only in whole milk and fish oils. Most cereals are practically devoid of vitamin A. Being fat soluble, almost all of the vitamin is removed from milk with the cream, so that skim-milk is not an alternative source. Best method of supplying the vitamin is, where possible, to have a small patch of irrigated green fodder, preferably lucerne, growing near the piggery, and from this, a small amount of green feed can be supplied each day. A handful per pig is sufficient. Cod-liver oil or other fish oils, which contain large quantities of the vitamin, can be fed to pigs, but unless used in small qauntities and their use is discontinued for the last two months of the fattening period, the quality of the bacon may be affected by these oils. A fish-oil emulsion fed to suckers at Rutherglen was successful in rapidly alleviating acute deficiency symptoms. However, such a method is not practicable on a large scale.

Green plants, when cut and dried for hay, lose a large proportion of their vitamin content, but sufficient is retained to allow hay to be fed as a source of the vitamin. The vitamin A content of the hay will depend on the leafiness of the plant when cut, and the time that has elapsed since cutting. Colour (greenness) is a good indication of the value of hay as a source of vitamin A. Old hay has practically no value. Lucerne or clover hay, preferably chaffed for easier feeding, is the best source, and supplied at the rate of ½ to 1 lb. per day will correct any deficiency.

An experiment designed to demonstrate the effect of pasture on pigs' growth was conducted at Rutherglen during spring and early summer of 1941, from 15th September to 15th December. Conditions at the time were warm and dry—such conditions, although adverse for pasture growth, were ideal for pigs' health.

Experimental Procedure

Six litters, comprising 44 pigs, were evenly divided after weaning to four groups, so that each litter was equally represented in each group, and all groups were approximately the same average weight. Two lots were run on good mixed grass and clover pasture, and the other two were run in yards bare of any trace of pasture. Areas of the four yards were equal, and housing conditions were similar. All four groups were self-fed pollard and 5 per cent. meatmeal. The accompanying table shows the results of this experiment.

RESULTS OF PASTURE FEEDING EXPERIMENT

	Pasture.	*No Pasture.*
Number of pigs	22	22
Average weight start	46·2 lb.	44·7 lb.
Average weight finish	156·6 lb.	133·8 lb.
Total gain	2,429·0 lb.	1,961·0 lb.
Average gain per pig	110·4 lb.	89·2 lb.
Total pollard eaten	8,820 lb.	6,821 lb.
Total meatmeal eaten	441·0 lb.	341·0 lb.
Gain per pig per day	1·21 lb.	0·98 lb.
Pollard per lb. gain in weight	3·6 lb.	3·5 lb.
Total weight finish	3,445 lb.	2,944 lb.
Dressed weight (calc.)	2,549·3 lb.	2,178·5 lb.
Cost of pollard	£24 4 3½	£18 14 6
Cost of meatmeal	2 15 1½	2 2 7½
Cost of slips	16 10 0	16 10 0
Total cost	£43 9 5	£37 7 1½
Average cost	£1 19 6	£1 13 11½
Value of carcasses	£69 0 10½	£59 0 0½
Average value of carcasses	£3 2 9½	£2 13 7½
Net return from slip to porker per pig	£1 3 3	£0 19 8
Difference	3s. 7d.	

Values used in costing—Pollard, £6 3s. per ton.
Meatmeal, 1½d. per lb.
Slips, 15s. each.
Carcasses, 6½d. per lb. dressed weight.

It can be seen that at the end of 91 days the pigs running on pasture averaged 22 lb. heavier than the "no-pasture" groups. The table also shows calculated financial returns, advantage to the pasture-fed pigs being 3s. 7d. per head. It is interesting to note that the amount of pollard eaten per lb. gain in weight is almost identical in each case, being 3·6 lb. for those with pasture and 3·5 lb. for those without pasture. This indicates that the amount of food obtained from the pasture was not sufficient to alter grain requirements, its chief value lying in the fact that it enabled more rapid consumption of food, and increased gain in weight per day.

The green pasture was not available during the whole period of the experiment, the pasture having dried off in mid-November, from which time limited quantities of dry pasture only

[*Continued on page 505.*

STILL MORE POTATOES ARE NEEDED!

By W. J. B. McDONALD, B.Agr.Sc., Senior Plant Investigation Officer

FOR many weeks both the civilian and military population in Australia have been without adequate supplies of potatoes, and a great number of people have been without this vegetable altogether.

The potato is a very valuable (and normally) economical foodstuff especially to the lower and middle income group. In wartime it is also an important military food-stuff, especially since it can be carried in a fresh condition over long distances or stored over relatively long periods without serious deterioration.

It is reasonably rich in anti-scorbutic vitamins which are essential to the general health of the individual. In normal times, the average citizen obtains these vitamins from the consumption of a wide range of fresh green vegetables. In many areas of military importance, however, fresh green vegetables are virtually unobtainable and, in consequence, the provision of adequate supplies of potatoes becomes doubly important.

Being rich in starch, the potato is a valuable energy producer, and at no time in our history has there been such a demand for the maximum output of energy by each individual.

Early this year governmental authorities realized that there was likely to be a potato shortage, and recognizing this crop as one essential to a maximum war effort and the general well-being of the community, it was decided that the area normally planted to potatoes in all potato-growing States should be increased this planting season by 50 per cent. This means that Victoria, which is the largest potato-producing State in the Commonwealth, is expected to plant 56,500 acres to this crop, and the Minister of Agriculture, the Hon. E. J. Hogan, has assured the Commonwealth Government that the Department of Agriculture will accept the responsibility for finding that acreage in Victoria this year.

In order to protect potato growers against unpayable prices, however, in the event of a favorable season providing prolific crops, the Commonwealth Government has invited all potato growers to produce under contract to the Australian Potato Committee, which is a Commonwealth instrumentality set up for the purpose of controlling the production and distribution of potatoes under wartime conditions.

All contracting growers are guaranteed that for main crop potatoes of New or No. 1 Grade they will receive not less than £8 10s. per ton Melbourne for Carmans and Up-to-Dates, or not less than £8 per ton Melbourne for Snowflakes. For deliveries prior to the end of January, 1943, guaranteed minimum prices are higher. If, however, the price which the market can offer for potatoes is greater than these guaranteed minimums, then the grower will take the advantage of the higher price.

Some growers believe that by signing a contract they thereby sacrifice some degree of control over the disposal of their produce. It must be emphasized that the Australian Potato Committee already is clothed with ample powers to control absolutely, should any control be necessary, the distribution of potatoes, and it is emphasized that non-contracting growers cannot expect any greater freedom of action than contracting growers. On the other hand should a prolific crop occur non-contracting growers will not be entitled to the protection afforded by the guaranteed minimum price.

Every potato grower producing more than one acre of potatoes should protect his own interests by effecting a contract with the Australian Potato Committee.

Owing to enemy action, fertilizer supplies to the Commonwealth have been greatly curtailed, but all contracting potato growers can obtain sufficient fertilizer to assure them a satisfactory commercial crop under normal seasonal conditions. Fertilizer is not available to non-contracting growers except where the area concerned is one acre or less.

The Department of Agriculture is handling the business of effecting contracts with potato growers in this State and already meetings in all the main potato-growing districts have been

addressed by the Minister of Agriculture and Departmental officers, so that growers may be fully aware of all the implications of the contractual system of growing potatoes. They have been asked to increase their acreage by 50 per cent., and the majority have shown their appreciation both of the need for potatoes and of the conditions offered them, by slightly exceeding this figure.

At 5 p.m. on 16th September, 1942, 3,452 contractors had undertaken to produce 41,501 acres. This same group of farmers grew 27,339 acres last season. The percentage increase in acreage by this particular group equals 51·6. The total acreage planted in Victoria last year was 35,500 acres according to figures supplied by the Government Statist.

Details of contracts and acreage contracted for, are set out in the accompanying table.

It is obvious, therefore, that contracts have not yet been effected by farmers who produced about 7,000 acres last season. If this particular group of farmers will maintain the standard set by the majority of their fellow growers the Victorian potato industry will have just cause for being proud of its contribution to an important national wartime effort.

Of necessity the success of this campaign for an increased acreage must rest in the hands of the regular potato grower, especially the growers in localities which are suitable for the production of Snowflakes.

At the present time seed of other varieties is practically exhausted, and no further substantial increase of the area devoted to Carmans or Up-to-Dates can be expected.

If, however, every grower does his utmost, irrespective of the difficulties and inconveniences inevitably associated with war, Victoria's objective of 56,500 acres will be realized.

	Number of Growers.	Acreage Contracted for 1942–43.	Acreage Planted by Same Growers in 1941–42.
Ballarat	658	12,877	9,016
Koo-wee-rup ..	377	5,266	3,259
Warragul ..	478	3,960	2,440
Otway	94	663	383
Woodend ..	203	4,648	3,695
Warrnambool .. }	127	1,781	1,439
Koroit .. .. }			
Kinglake ..	108	1,534	1,017
Emerald	230	3,198	1,801
North East ..	157	1,004	531
Romsey	91	1,303	956
South Gippsland ..	314	1,768	815
Colac	100	690	359
Portland ..	80	505	293
Miscellaneous ..	435	2,304	1,335
Total ..	3,452	41,501	27,339

Increase in acreage = 14,162 acres.
% increase = 51·6.

AUSTERITY NOW MEANS PROSPERITY LATER

THE IMPORTANCE OF PASTURE FOR PIGS—*continued from page 503.*

were available. Notwithstanding this, a considerable advantage in growth and condition was obtained by the pigs which had access to pasture. Had green pasture been available throughout the whole period of the experiment, the differences probably would have been greater than indicated.

In addition, when calculating the financial returns, a uniform valuation of 6½d. per lb. was adopted irrespective of the quality of the various pigs concerned. The "finish" of the "pasture" pigs was noticeably better than the "no-pasture" pigs, a few of the latter being so lacking in condition as to be unmarketable. The dressed weight throughout having been estimated at 74 per cent. of the live-weight, a further unearned advantage was given those pigs in lighter condition. Had it been possible to eliminate all these factors, the difference in favour of pasture feeding would have been even more apparent. Even under conditions of valuation which penalized the better pigs, an increase of approximately 15 per cent. in net returns was obtained for pigs which had access to pasture.

GRUB INJURY TO PASTURES

A Review of the Recent Outbreak

By R. L. TWENTYMAN, B.Agr.Sc., Agrostologist and
R. T. M. PESCOTT, M.Agr.Sc., F.R.E.S., Entomologist

DURING the past winter, cockchafer grub damage to pastures in Victoria has been unusually severe, and, in some instances, the stock-carrying capacity of properties has been so reduced as to necessitate either the selling of stock or their transfer to unaffected districts.

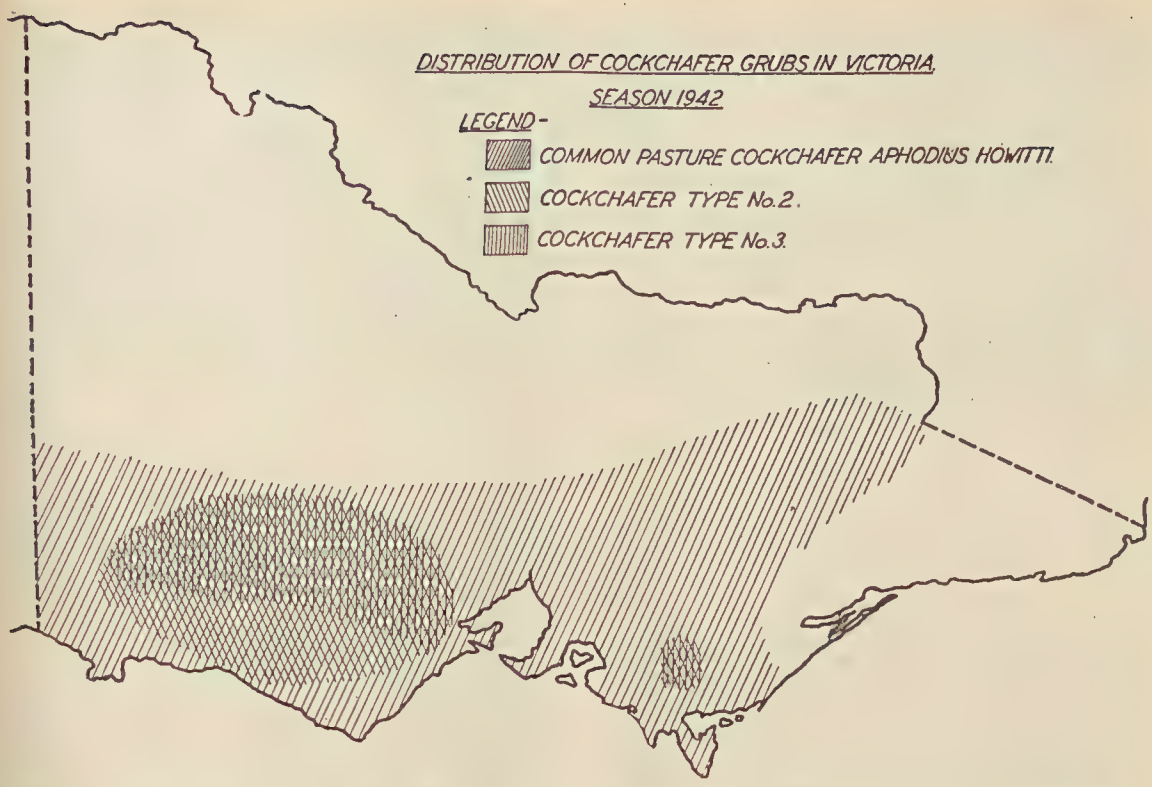
Grub injury to pastures has been a regular seasonal trouble for many years; in fact, similar damage to pastures in the Western District is known to have occurred in the very early days of settlement. During recent years, notably in 1938, instances of severe damage by these grubs have been recorded almost every winter, but the destruction caused during the past winter was on a much larger scale than usual. The reaction of property holders in some districts to this recent grub attack has been one of extreme alarm, but a widespread survey of the damaged areas has revealed facts which indicate that, while loss and damage on particular properties has been very serious, the grubs in most areas are not indiscriminately widespread, and there is reason to believe that a satisfactory method of control may be evolved.

In general the trouble has been confined to the southern portion of Victoria and the wetter parts of the North-East.

It should first be pointed out that two distinct types of grub have been operating in Victoria this year. In Gippsland and in some of the wetter parts of the Western District many paddocks have been damaged by the Underground Grass Grub, *Oncopera sp.*, a native insect having a large, dark-green coloured caterpillar measuring roughly 2½ inches long when mature and which emerges as a moth. This insect usually attacks paddocks carrying old, long, dry feed. The presence of this grub in a paddock is usually indicated by the occurrence of patches of old, dry grass among which there is a strange absence of the usual green grass shoots. On examining the patches more closely, vertical tunnels lined with silk will be found in the ground penetrating to a depth of up to 12 or 16 inches. The grub lives during the day time in this tunnel, emerging during the evening and night to feed on grass immediately around the entrance to the tunnel. In many cases chewed off portions of the grass are taken down into the tunnel and eaten there during the day time. This insect is almost solely confined to paddocks or roadsides on which long, dry feed has been permitted to stand from the previous spring, and the removal of this old, dry feed by grazing, mowing, or burning in the summer is an effective means of control.

In contrast to the above, the cockchafer grub —which has caused most of the trouble in the Western District this winter—leaves the damaged areas of pasture in a state of semi or complete bareness. In some cases paddocks of 70-80 acres have been completely denuded of every vestige of green stuff, the ground having the appearance of a well-prepared fallow, while in other cases, areas of up to 1,000 acres on an individual property have shown more or less severe damage. In most cases, however, only portions of paddocks have been affected, and the damaged areas usually consist of irregularly-shaped patches throughout the paddock. In some cases damage is confined to stock camps, the base of stoney rises, around shelter trees—particularly on the north-east side, and on patches that were bare in the autumn owing to a prolific growth of cape weed or thistles in the previous spring.

Subterranean clover pastures have been most severely damaged, and the stronger the previous growth of clover the more severe has been the damage. While certain types of pasture and soils appear most liable to injury, there have been found sufficient exceptions to indicate that no hard and fast rules can be laid down. Generally speaking, heavy soils which contain a sufficiently high proportion of clay as to enable them to crack during the summer

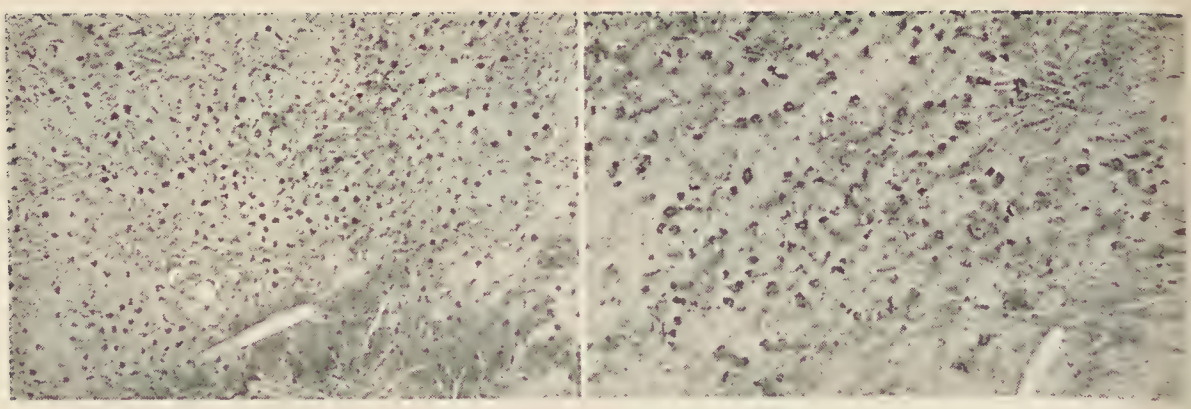


months are not affected. Sandy soils, friable well-drained loams, and the red volcanic and the stoney rises are the types of soil in which the grubs have been most active.

Late in July an appeal was made by the Department of Agriculture through the press and by wireless asking that specimens of grubs damaging pastures in various districts be forwarded in order that a survey of the types of grubs present could be made. Inspections in the field and examinations of the grub specimens forwarded to the Department, so far, have revealed that about eight distinct types of cockchafer grubs are operating in various parts of the State, and of these, three species are extremely common. Although there is this variety of grubs present in the soil, it is considered that during the past season, the greater part of the damage was caused by one species, the common Pasture Cockchafer, *Aphodius howitti* Hope. In affected areas the grubs of this species can be readily located by digging with a spade, dozens of grubs usually being exposed with each spadeful of earth. The affected ground is generally honeycombed with numerous vertical holes, each about the diameter of a pencil, roughly 4 to 6 inches deep, but not lined with silk. The grubs when first dug are curled up, but, after being disturbed, quickly straighten out and crawl away. When fully grown, these grubs are about seven-eights of an inch long and three-sixteenths of an inch wide, having a dark-brown to black head and a dirty-grey, semi-transparent body colour. A distinguishing pattern of hairs underneath the last abdominal segment can be seen with a magnifying glass. In all damaged areas inspected, these grubs were of about the same growth stage, and the smaller and larger types of grubs usually found with them are distinct and separate species.

Arrangement of hairs on tail end of the common Pasture Cockchafer.

The large, white, "sleepy" curled grub so frequently seen when ploughing is another cockchafer grub, but, except in isolated areas, was not the cause of recent damage to pastures.



Cockchafer grub holes in damaged pasture land. Left—Holes revealed after removal of surface soil with a spade. The coin is a sixpence. Right—Surface holes formed by grubs under wet-soil conditions.

The adult insects which develop from the destructive grubs so common this year are small, black-brown beetles ½ inch in length and which are found swarming in vast numbers in late January of each year. They are very strongly attracted to light, and in the city of Warrnambool, in January, 1941, four and a half dray loads of these beetles were collected from one street corner alone. These beetles lay their eggs in pastures early in February in small earthen cells at a depth of about 4 inches. These eggs hatch in approximately three weeks, and feeding commences immediately on the roots of the plants only.

With the advent of the first substantial autumn rains which soften the surface of the soil, the young cockchafer grubs come above ground at night, and commence feeding on the foliage of the pasture plants as well. Thus damage to pastures may be occurring for some two months before the presence of the grubs is apparent to the farmer.

Active feeding continues during the winter months until about the end of August, when the grubs cease feeding and remain in the soil in specially constructed earthen cells about 6 inches below the surface, where they remain until they pupate in October, emerging later as the adult beetles in January as previously mentioned.

At first sight it would seem that this cockchafer grub strikes pastures at random, and there would appear to be no particular reason why any or all of the pastures in a district may not be devastated. An extensive examination of the affected areas has revealed, however, that this is not the case, and although there is no definite limit to the types of pasture affected, it is evident that while certain types of pasture are very liable to attack, other pastures are almost entirely free from injury.

Types of Pasture Affected

Native pastures and pastures consisting of vigorous perennial species have usually not been damaged to any great extent, but pastures consisting mainly of subterranean clover and annual species have been very severely damaged. Most of the damage has occurred on pastures which normally would possess a bright green colour during the winter, and in districts which normally would provide good winter grazing. It is thus the best winter pastures, and those which in normal years would carry the greatest number of stock during the winter, that have suffered most severely.

Subterranean clover pastures have been most severely damaged, and where the associate grasses consisted of Wimmera Rye, Water Grass (*Poa annua*), Hair Grass (*Festuca bromoides*), Sterile Brome Grass (*Bromus sterilis*), or non-vigorous perennial rye grass, then the devastation has usually been complete and the pasture entirely destroyed. The grass species *Phalaris tuberosa, Danthonia, Microlaena*, and strongly growing perennial rye grass have usually withstood the grub attack well. The damage to subterranean clover pastures has been most severe where these pastures have been established after cropping. Where the subterranean clover has been established in a native pasture and an effort has been made to preserve the native grasses, then the damage to the pasture has usually been much less serious.

Possibility of Control

One of the main difficulties in controlling this pest is the fact that, as a rule, it is not until the grubs are well established and the growth on the pasture has been thinned out that the property holder becomes aware of their presence. In some cases the damage appears to start in small patches from which the grubs work outwards in a face, while in others there is a sufficient distribution of grubs over the whole pasture for the grubs gradually to destroy the whole area. Grub injury usually is worst following dry autumns, and the weak pasture plants in such seasons are not strong enough to withstand the grub injury. There is considerable evidence to suggest that strongly growing pastures consisting of well-rooted perennial plants, are capable of making good growth despite the presence of considerable numbers of grubs.

During recent years, it has been a widely held opinion that the grubs had become increasingly active as the result of a succession of dry seasons, and it was thought that once good winter rains were received the grubs would be drowned. While the past autumn in the Western District was dry, exceptionally wet weather was experienced in May, and wet conditions continued throughout the winter. The grubs on the well-drained banks continued to operate very actively, but those on the flooded plain, though checked, exhibited a remarkable endurance to the wet, flooded conditions. They were obviously capable of remaining alive under very wet conditions, and though many have been drowned, it has been recorded that where some have floated around apparently drowned in small pools of water, they immediately burrowed in again when the water subsided. In the majority of cases, however, where water has remained on the surface of the ground for 24 hours, the grubs have been destroyed.

The feeding out of grass hay on affected areas has been advocated by some as offering a means of control. This may be useful if the ground could be poached by cattle, but on well-drained soils the only apparent advantage of this practice would be in the seed likely to be introduced to the bare area from the grass hay.

The grubs have been particularly destructive on the stoney rises country, and here the use of any cultivating implement is almost impossible.

Where the pasture has been entirely destroyed on land that can be cultivated, ploughing and re-sowing offers the best means of overcoming the trouble.

The timing of the cultivation and sowing and the type of crop sown will have a considerable bearing on the success of this operation. Flax appears to be very sensitive to grub injury, but where oats and wheat have been sown on grub-damaged pastures that have been cultivated, the crops promise well. A grub-worked pasture may appear to offer an ideal

Left—Grubs have worked in a face from fence into the pasture just beyond where scattered hay is lying.
Right—An oat crop successfully established on grub-damaged pasture at Wickliffe.

seed bed on which to sow more seed, but steps must be taken to check the grubs if the sowing is to be successful. In sowing early, it appears to be necessary to check the grubs by ploughing followed by a cultivation before seeding. Later in the season the sowing may be preceded by a heavy scarifying only, but if the grubs are nearing the dormant stage, seeding with a combine only may be successful. In some cases, the remaining grubs may thin out patches of the resultant crop, but the check that they receive from the cultivation, and the fact that the oats appear to be capable of growing away from the grubs enables the crop to develop satisfactorily.

One very noticeable feature in some of the districts affected has been that the activity of the grubs often stops sharp on a fence line, even where the fence divides two apparently similar pastures. Quite frequently the grubs cleaned out paddocks right up to the roadside fence but did not go beyond the fence line.

At Lake Bolac, where a large area of pasture was burnt early in January, 1942, it has been observed that, though the grubs were quite active on adjacent pasture land, the burnt area has remained entirely free from them.

It was observed on one property, where the grubs had been particularly bad on paddocks that had been heavily grazed or where cut for grass hay, that an adjacent pasture on which the feed had been left long had entirely escaped injury. Similar observations have been made in other districts, and in some it is considered that if the feed is left long in the summer and autumn, little or no trouble will be experienced with the grubs. This is, of course, the reverse to the case of the Underground Grass Grub.

All these observations seem to point to the fact that there is probably some simple influence that either attracts or repels the beetles at egg-laying time or that favours or retards the development of the young grubs. What the determining factor is has not yet been ascertained, but it would appear to exert a very powerful effect on the incidence of grub injury.

Most insect plagues appear to have some natural means of control, and we have recently found a fungus destroying these grubs in a number of places. This fungus has been found at Chatsworth, Penshurst, Skipton, and near Melbourne, and is possibly even more widely distributed in Victoria. This fungus may offer a useful means of control providing the conditions which favour its development can be ascertained and its development in the field encouraged.

While it is possible that eventually some satisfactory means of coping with the cockchafer grub pest will be developed, the urgent problem is how to avoid injury now, for it is probable that on suitable soils there will be a recurrence of the trouble so long as favorable pasture and climatic conditions are provided.

The main lesson to be learned from this recent outbreak is the danger of depending on pastures consisting of one species or one type of species only. Subterranean clover pastures are particularly vulnerable to grub attack and the annual associate grasses possess little power to withstand the injury. The annual pasture species are very susceptible to attack compared with perennial species, but unless the perennial species are making good growth, they also are likely to suffer severely. Probably the worst cases of damage this year were on fertile land which, on account of soil texture or climatic conditions, was hardly capable of maintaining good perennial rye grass; or where the rye grass had been weakened by the pasture being cut for clover and grass hay last spring. Adjacent pastures in which *Phalaris tuberosa* had been established were usually quite unharmed. Thus it would seem advisable in re-establishing pastures in country where grub injury is likely to occur, that more use should be made of *Phalaris tuberosa*.

A dead cockchafer grub destroyed by a fungus.

The ploughing of a paddock appears to provide a useful, temporary degree of immunity to attack, and pastures growing on land ploughed one, two, or three years previously were usually unharmed, but paddocks ploughed four and five years previously suffered severe injury. Heavily top-dressed pastures, and properties which are usually heavily grazed, suffered much more severely than paddocks that had been less liberally manured, or properties that were more leniently grazed.

The re-establishment of pastures on denuded areas is not quite as simple as it might appear

[*Continued on page 512.*

Inland Killing

New Bill Introduced

IN the Legislative Assembly on the 16th September the Minister of Agriculture (Mr. E. J. Hogan) moved the second reading of the Victorian Inland Meat Authority Bill. The Minister stated that during the debate on the Bill to authorize the Treasurer of Victoria to guarantee an overdraft of £30,000 at the Commonwealth Bank for the Amalgamated Freezing Company (Victoria) Proprietary Limited, he had informed honorable members that he would shortly introduce a Bill providing for the re-organization of that company, and for the establishment of inland killing of livestock in the country districts of the State. The present Bill was the one referred to. In addition to its other advantages, the Government regarded the Bill as an important contribution to its policy of decentralization.

The Government believed, Mr. Hogan continued, the proper place to slaughter livestock intended for consumption was as near as possible to the farms on which the stock are raised. By doing that there would be considerable savings to stock raisers and to the community, by eliminating loss of weight of the live animals during transport to the metropolis and pending their sale and removal to abattoirs; by preventing losses owing to suffocation in trucks and sale yards; and also by avoiding depreciation in quality by bruising in trucks and in overcrowded pens in congested markets. This loss of weight in bringing live lambs from the country to Melbourne is considerable; and if it averaged only 3 lb. a head it would amount to 8 per cent. on a 36-lb. lamb, and, together with the other losses and depreciation of the lamb, would cost producers more than £250,000 a year. That would be a huge economic loss.

There would also be savings in railway rolling stock and coal, which is very important at present, added Mr. Hogan. In addition, the public would get better meat when inland killing is inaugurated than they were getting now. During the export season it is not unusual for lambs to be taken from their mothers in the paddocks in the northern part of Victoria on Sunday afternoon; then they are driven to the railway station and loaded on trucks so that they shall reach the Newmarket sale yards on Monday evening. They are driven to the sale yards from the Newmarket railway siding during Monday night or early on Tuesday morning. On Tuesday the lambs are sold at auction—perhaps 100,000 of them are sold during that day—to the proprietary freezing works in Melbourne. Those concerns cannot slaughter and chill 100,000 lambs on Wednesday; the whole of the consignment would not be slaughtered and chilled until two or three days, and sometimes four days, after the sales on Tuesday. If 100,000 lambs were sold on the Tuesday and were treated by the metropolitan concerns at the rate of 25,000 a day, four days would be needed to treat the total number. This would mean that lambs taken from their mothers and off grass at the point of production on Sunday may not be killed until Thursday or Friday.

In reply to a statement by Brigadier Knox that the lambs may be taken from grass on the Saturday, Mr. Hogan said he did not wish to overstate the position, but the loss of weight that ensued was an economic fact that people should be compelled to realize. Under the present method of disposing of the stock in Melbourne on Tuesday, the animals cannot be killed and treated until the following Thursday or Friday. During that period, being without food and water, the animals lose not only their bloom but also considerable weight. If a 36-lb. lamb lost only 3 lb., the loss would be 8 per cent. of its weight.

Mr. Hogan directed attention particularly to the economic loss incurred in bringing live sheep and lambs to Melbourne for sale at Newmarket, when they cannot all be slaughtered until three or four days after they are sold. Assuming that the average loss of weight on each lamb is 8 per cent. and that there are 3,000,000 lambs slaughtered annually in Victoria, the enormous economic loss involved can be realized. Some persons have asserted that there is no loss of weight incurred in bringing live sheep and lambs to Melbourne for sale, but, continued the Minister, no practical

farmer who killed his own lambs would take a lamb off its mother on a Sunday, lock it up in a yard without food and water, and not kill it until the next Friday or Saturday. It would have lost weight and quality, and have deteriorated to such an extent that, instead of slaughtering it, the farmer would turn it out again.

Another important aspect of the matter, said Mr. Hogan, was the great disparity in rail freight in sending live lambs or sheep to Melbourne and sending frozen carcasses to Melbourne. As an illustration, comparative rail freights from Bendigo to Melbourne on live lambs and on frozen lambs are quoted. The freight on a truck of 132 lambs from Bendigo to Melbourne costs £4 9s. 11d.; the freight on 132 frozen lamb carcasses in truck lots costs £1 9s. 6d. The rail freight on live lambs from Bendigo to Melbourne costs £2 6s. 3d. a ton, and the freight on frozen lamb carcasses costs 15s. 2d. a ton. Putting it another way, the freight on a live lamb from Bendigo to Melbourne is 8d., and on a frozen carcass, 3d.

From these figures, it is apparent that not only was there great economic waste in bringing live lambs or sheep from the country districts to Melbourne for slaughter, but there was also unnecessary rail freight, which should be avoided, particularly when a heavy strain is being placed on the railways in connexion with war activities.

Mr. Hogan stated that he was sure the economic side of the problem would impress all honorable members. The most suitable field for decentralization was in connexion with this particular industry. It was preferable that the slaughtering and processing should be done near the point of production instead of bringing the live animals to Melbourne under conditions which caused great economic waste and also involved conditions of cruelty.

The Bill provided for the re-organization of the Amalgamated Freezing Company (Victoria) Proprietary Limited to enable sheep and lambs to be slaughtered and processed near the point of production. The old company would disappear, and its assets would be vested in a new authority, which would carry on and expand the trade in export lambs formerly conducted by the Amalgamated Freezing Company. The new authority would slaughter live stock and treat and chill it in prescribed inland districts under modern hygienic conditions. The authority also would be given power to improve abattoir facilities in country centres, and, subject to the consent of the Governor in Council, may close down obsolete abattoirs in prescribed areas and compensate the owners and also provide for a better meat supply to the residents of the district.

The Government, concluded Mr. Hogan, recognized the importance of a strong organization, independent of the large exporters, to ensure that producers received at all times the full value for their lambs, and particularly for export lambs.

GRUB DAMAGE TO PASTURES—*continued from page 510.*

at first. Pastures that have only been thinned should thicken up on their own, but unless the completely denuded areas are re-sown, they may be invaded by weeds, and a very poor type of annual pasture may develop.

On land that can be ploughed, the most satisfactory method is to plough and cultivate the ground and towards the end of July sow oats together with some perennial rye grass seed and *Phalaris tuberosa*—3 and 1 lb. per acre should be sufficient. There should still be sufficient subterranean clover seed in the ground to enable it to become re-established.

Much of the grub damaged pasture was on stoney rises land and here cultivation is not possible. Excluding burning, it seems that the only way of preventing a repetition of grub injury on such areas will be to reduce the number of stock grazing them in the summer and to try and retain some old feed on them until the young autumn growth appears.

Summary

During the past winter, cockchafer grub injury to Western District pastures was unusually severe. Such injury is usually most severe after dry autumns and is worse on friable, well-drained soils. Pastures consisting of annual species are most seriously affected and a vigorous growth of subterranean clover, cape weed, or thistles in the previous spring appears to encourage attack. Paddocks which have been heavily stocked and heavily "supered," and which should possess a bright, fresh, green colour in the winter, have suffered severely. Perennial pasture species possess a useful degree of resistance to the pest, and *Phalaris tuberosa* has been almost unharmed. Severely damaged pastures on ploughable land should be cultivated and sown with oats and sufficient perennial grass seed to enable the pasture to become re-established.

Soil Drift Control

Results of 1941-42 Competition

Report of the Judge—
H. HANSLOW, Commissioner,
State Rivers and Water Supply
Commission.

Soil drift from fallowed land along a Mallee road.

THE second and final inspection of farms entered in the Soil Drift Control Competition for the Hanslow Cup and other prizes was completed on 22nd April, 1942.

The competition was designed to discover "The Best Effort to Control Soil Drift on a Mallee Farm." In addition to the main competition for the Mallee championship, there were five other competitions for different sections of the Mallee.

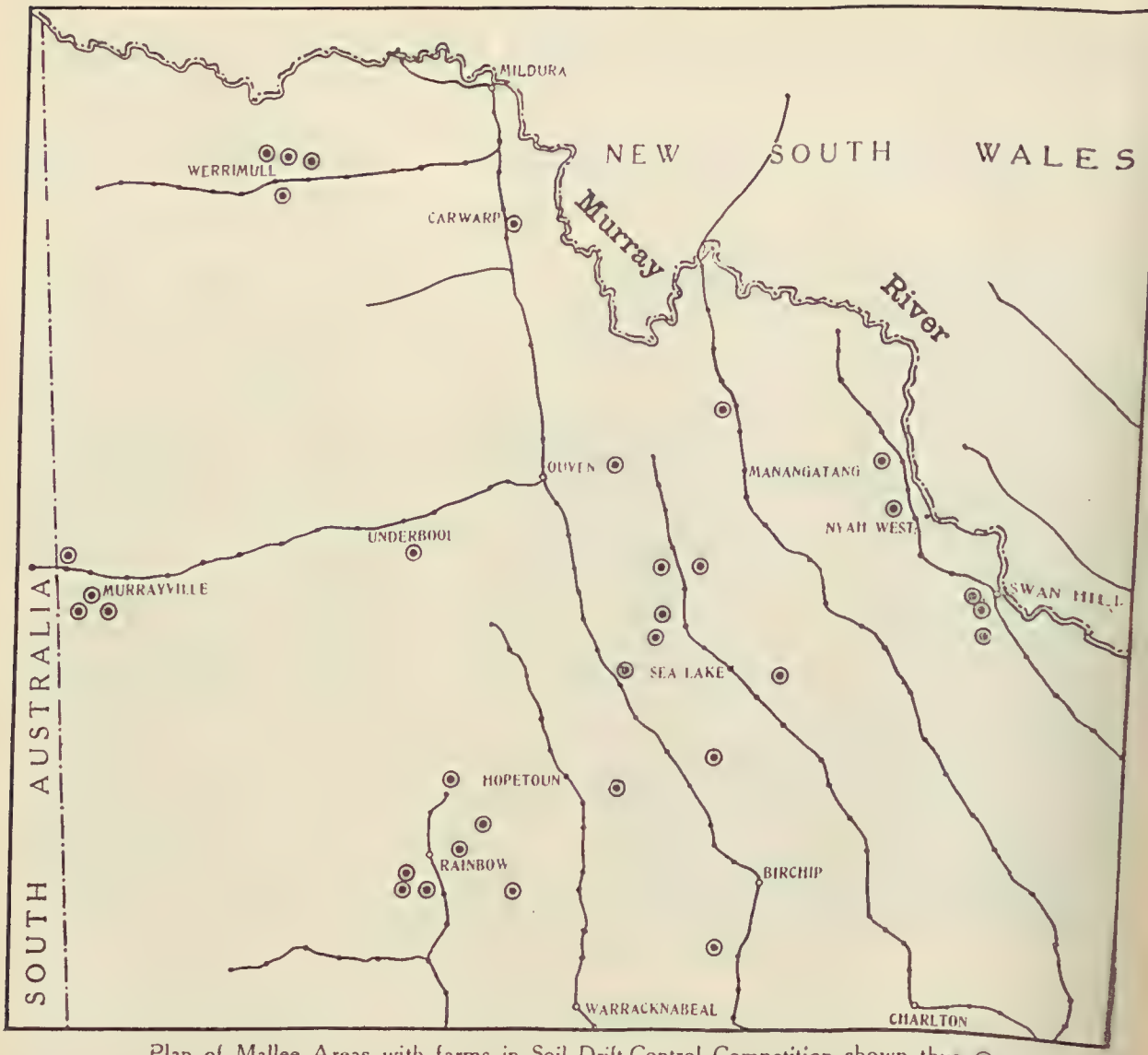
The prize money for each of these subsidiary competitions was £15 first, £7 second, and £3 third, but if there were less than ten entries no third prize was awarded.

In addition, the Champion would hold the Hanslow Cup, valued at £50, for twelve months, and at the conclusion of this period would receive a replica of the cup. There was also a cash prize of £10 10s. presented with the cup.

The cash prizes were donated by H. V. McKay, Massey Harris Pty. Ltd., the International Harvester Co. of Australia Pty. Ltd., the State Savings Bank of Victoria, W. C. Thomas and Sons, Noske Bros., Melbourne and Geelong Woolbrokers' Association, and W. S. Kimpton and Sons.

The main conditions of the competitions were as follow:—

The judge to take into consideration the problems faced by each individual farmer, to assist in assessing the difficulties peculiar to his farm. Even the best effort to control soil drift may not result in complete success. Consequently, the competition was judged mainly by the efforts made and the degree of success achieved in reducing soil drift on the cultivated areas farmed by the entrants and in relation to their general farm management and economy.



Plan of Mallee Areas with farms in Soil Drift-Control Competition shown thus ◎

The competitions were judged by officers of the Department of Agriculture, who took the following matters into consideration:—

(1) Steps taken to prevent or minimize drift on—
   (*a*) Fallowed land, e.g., by cover crops, cultivation methods, retention of stubble, &c.
   (*b*) On other land, including stubble and other grazing land.

(2) Success achieved in the protection of channels, roads, fences, buildings, &c.

(3) Suitability of general farming methods for the preservation of soil fertility, and reduction of sand drift, including consideration of crop rotation, stocking methods, fodder conservation, and weed control.

In awarding points, the judge gave full consideration to the susceptibility to drift which varies with the soils on each farm. This provides a concession to the entrants faced with greater problems of drift control than other competitors, and due to no fault of their own.

Owing to pressure of war work the Department of Agriculture was unable to provide judges for the second judging, but the notes of the first judges were available to the writer, who made the final judging.

Results, Soil Drift Control Competition, 1941-42.

Shire.	Number of Entries.	First.	Second.
Mildura	5	A. J. Brown, Carwarp ..	S. R. Jones, Werrimul
Walpeup	6	F. W. Boettcher, Murrayville ..	J. G. Mickan, Murrayville
Swan Hill	6	V. K. Watson, Nyah	A. J. M. Sinclair, Swan Hill
Dimboola and Karkarooc ..	9	A. H. Schack, Gama	G. S. Staples, Rainbow
Wycheproof and Birchip ..	9	H. G. Broad, Woomelang ..	Walton McManus, Sea Lake

The winner of the championship was Mr. A. H. Schack, of Gama, with Mr. G. S. Staples, of Rainbow, a very close second.

Soon after leaving Mr. Staples' farm we examined a fallow paddock that was drifting badly. Bare sub-soil showed in all parts of the paddock. The next and succeeding crops from this paddock are going to be bushels per acre less, and it is interesting to note that Mr. Staples, on similar land only a short distance away, by correct methods, was holding the soil. The state of this paddock and the comparison between the two properties made it clear that it is high time more strenuous efforts were made to prevent the tremendous waste of good land that is taking place in the Mallee to-day.

The Soil Drift Control Competition was inaugurated in the hope that the judges, by examining the competitors' farms and comparing methods, successes, and failures, would be able to convey valuable information on drift control to other Mallee farmers, and so help them with their drift problems.

Seventeen farms were entered in the competition last year, and twenty-three this year.

The Mallee farmer should know that all Mallee lands will drift if conditions are favorable to drifting, and, therefore, his first thought before any action is taken on his farm should be "Will this be likely to start drift?" Having learnt how it will start, the next thing to learn is how to prevent it.

One of the best protectors of soil from drifting is stubble, which on no account should be burned. It is very awkward to work land with a heavy crop of stubble, which gathers up in the implement. On the other hand, the man who always takes the easy way never gets far.

Because many Wimmera farmers have made a success of a two-course rotation, wheat-fallow-wheat, that same rotation would not necessarily be successful in the Mallee. Generally speaking, a disk drill or a sunder seeder will do the job of sowing oats on the stubble, or oats can be broadcast in front of a Wimmera scarifier. It has been proved all over the world that land which has been farmed for one crop only, be it wheat, maize, cotton, or tobacco, sooner or later will not grow that crop successfully, and a rotation system has to be adopted. Every farmer in the competition claimed to favour some rotation of farming such as—No. 1. Fallow, wheat, oats, fallow. No. 2. Fallow, wheat, oats, graze, fallow. No. 3. Fallow, wheat, oats to graze, oats or barley to strip. (This will ensure stubble to plough in.) Then, again fallow, wheat, oats, and graze for several years.

Left—Drift-sand near a dwelling, Walpeup Shire. Right—A Mallee homestead after 20 years of occupation.

Drift from a distant sandhill gradually encroaching on a Mallee homestead.

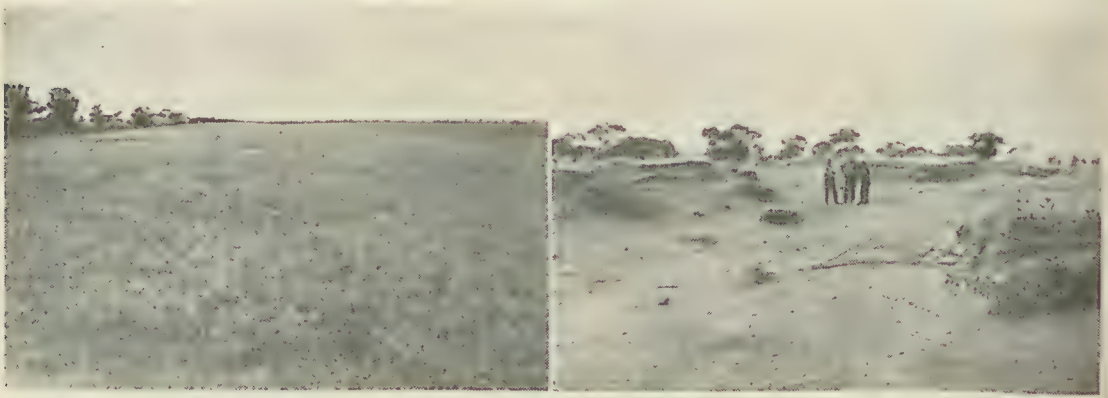
The longer the rotation the better. Paddocks that have been for some years in grass and ploughed late seem to hold the best. The rotation, however, has to be governed by the type of soil and the size of the area. The farmer with a big area can adopt a longer rotation than the man on the smaller area. Having once decided on and adopted a certain rotation, the farmer should stick to it and not be put out of his stride.

Most Mallee lands will not continue to grow grass, and it is advisable not to leave these lands too long on grass, or the land will not plough up as soddy as it should. Some competitors thought this was caused by the want of manure, and the writer is inclined to agree with them. It appeared that at any time a paddock was fallowed, unless it had a lot of grass roots in it and broke up cloddy, or unless there was a lot of straw or rubbish to plough in, then it would be advisable to "cover crop" it. It is suggested that the cover crop should be rye corn sown at about 30 lb. per acre as early as possible. Rye corn has a wonderful root system and binds well. It is good feed early, but later gets very hard and coarse, which is all to the good, for the stock will not eat it then and it will be there when it is wanted.

When fallowing, plough as much as possible at right angles to the prevailing winds, and do not plough the paddock in one piece. All farmers seen were of the opinion that when the ground was wet, as much as possible should be worked. Weeds should be kept down with the sheep, but this also could be overdone, as the sheep may tramp the ground too fine.

Care should be taken that no weeds run to seed, and fallow should be left as rough as possible. If rain occurs, advantage should be taken of it by cultivating at right angles to the prevailing winds with some implement that would leave the land in a very rigid condition. This can be done by taking some of the tynes off the implements and placing the tynes further apart. A disc implement for this work is likely to make the soil too fine. If the rain is light, the places susceptible to drift should be done first.

Mr. Schack's method of "crazy" work, as he called it, by marking the paddock in lands about a chain or two wide and zig-zagging up and down between the lands is a very effective method of getting over a lot of ground quickly. Should there be any blown spots in your



Left—A well-kept sandridge in one of the competitors' paddocks. Right—The same ridge in a neighbour's paddock.

A badly-blown sandhill. Note man standing beside stump, indicating the amount of soil lost.

paddocks, remember that these are the places where drift is likely to start. As there is little or no soil on these spots, they should be "busted up" deeply and left very rough—the rougher the better. This will trap a lot of drift and heal the blown spot. If the fallow flattens out and starts to drift, it is advisable to roughen it up in ridges as before.

On three of the farms judged this season three serious blows had started from a gateway into the fallow caused by sheep tramping it too fine. This could have been prevented if it had been roughened up in time, or if a few loads of straw or rubbish had been placed there.

On another place a blow started on the stubble where the wheat carters had been. This was prevented from developing by a few rounds with the plough.

On a sand hill down which the farmer was bringing a combine, he let the tynes lightly into the ground to act as a brake, and this caused a nasty blow.

Another man sowed a crop of oats on the fallow, but omitted to open the seed run across and back over the paddock. This part blew badly, but was checked with the plough by roughening.

A very deep scour, about 15 feet deep and half a chain wide seen in a sand hill had started where rabbits had been dug out. A few branches dropped at the right time would have prevented this.

The sand hills are the most likely places for drift to commence. Many are a very sorry sight, while some which, with a little care, could have been kept in production for ever, have been ruined for all time. Great care should be taken to keep sand hills always protected with vegetation, and never to graze them bare in the summer.

Mr. Staples, of Rainbow, is holding his hills remarkably well, but he never fallows those portions likely to blow. These places are sown, but not fallowed.

Judging at Mr. Schack's farm took place on the 16th April, shortly after a nice fall of rain of which he had taken advantage to work up and sow two hills with rye corn. It was up and doing well. He proposed to graze it all the winter, remove the sheep, let it go to seed in the spring, and strip it. Next year there will be a lot of rye stubble on it to plough in for fallow, but, to make doubly sure, he will fallow early and "cover crop" it with rye. He feels that by this method he will hold the soil.

Two paddocks seen had been fallowed with a combine and left very fine. One was in the Birchip district, grey, crab, holey country, timbered originally with buloke. One would have thought it impossible to make it drift but it had, and very badly. The crab holes in many cases were full of soil, with bare sub-soil showing in many places. For years it will be a very patchy paddock with rank crop over

the filled crab holes and stunted growth on the bare places. One wise thing the farmer had done was to sow a strip of oats about a chain or more wide around the fallow. This growth had caught the drift, otherwise the fence would have been covered.

The other farm was west of Sea Lake, a flat between sand hills. This had been fallowed in the same way, and had drifted badly, but the crop on the hill had caught the drift and prevented it from going far.

On another farm for half a mile the fallow had drifted through the fence and down-hill for a couple of chains, being about 2 feet deep at the fence. Thousands of miles of roads in the Mallee are impassable, due by soil blown from fallows. Considerable difficulty was experienced in getting to some of the competitors' farms, the party sometimes being compelled to drive through other farms to get there.

Messrs. Petschel Brothers, Yaapeet, had sown a strip 2 chains wide between their fallow and the fence, and this had kept the drift from reaching the fence. These farmers are doing a good job.

Another farm had a channel on the east side of the fallow and a strip of grass a chain wide between it and the fallow had caught the drift. The channel was clean, but a little further on a paddock had been fallowed right up to the fence, and it was covered to the third or fourth wire. It would be wise never to fallow near the fence or the channel, but to crop for 2 chains out at least.

The writer frequently has pointed out that a bad drift year and a bad financial year might arrive at the same time, and many channels would not be run, but he had not foreseen that, as a result of the war, the manpower position would prevent the Commission from running some channels. In one of the Water Commission's districts of 24 square miles to which stock and domestic water is pumped, there are ten land holders and eighteen tanks are filled. The cost of cleaning the Commission's channels to supply this area is £700 per annum, pumping costs are £126, ranging and administration costs £42—a total of £868. These channels are so full of sand this year and labour is so scarce that water will not be run in them this season.

In the last three years the Commission has spent £10,000 on resuming land adjacent to its channels, from which a large amount of sand had drifted into the channels every year. These places were fenced and planted with rye corn, which has proved a wonderful protection to the channels—the annual saving in the cost of removing drift being equal to a return of 27 per cent. on the capital cost. The method of protection by planting non-fallow crops adjacent to fences, channels, and dams is not expensive and, over the years, there should be little, if any, loss in production.

Some of the competitors, other than the winners, had protected their homes by leaving a lot of native bush around the homestead. Conspicuous among these was Mr. Pole, at Torpita. His home was situated in the Mallee; paths were made between buildings, and the bush was only lightly thinned and stock were fenced out. The result was very pleasing, Mr. Pole's only regret being that he had not left more growth. Trees that he is planting are protected by a guard of Mallee roots. Messrs. Conlan, of Nandaly, and Kiley, of Nyarrin, were making very determined efforts to protect their homes by planting. On the other hand, we saw many homes with little or no protection from the winds and dust. It must be very depressing on the women folk to live under such conditions.

The following is a list of trees, the seeds of which may be obtained in the Mallee:—

Native Plants Suitable for Propagation by Sowing or Planting in Average Mallee Soils.

(a) Areas where natural vegetation consists mainly of Cypress Pine, Belar, and Buloke—

(*Callitris robusta*)	Cypress Pine (Murray Pine)
(*Hakea vittata*)	Striped Hakea
(*Hakea leucoptera*)	Needle Hakea or Needle Bush
(*Myoporum platycarpum*)	Sugarwood (also called Sandalwood)
(*Acacia ligulata*)	Small Cooba
(*Acacia hakeoides*)	Hakea Wattle
(*Cassia Sturtii*)	Dense Cassia
(*Cassia cremophila*)	Desert Cassia
(*Dodonaea attenuata*)	Slender Hop-bush.

(b) Areas where natural vegetation consists mainly of eucalypts.—All the above, and in addition—

(*Eucalyptus oleosa*)	Oil Mallee
(*Eucalyptus incrassata*)	Yellow Mallee
(*Eucalyptus gracilis*)	White Mallee
(*Eucalyptus dumosa*)	Dumosa Mallee
(*Leptospermum coriaceum*)	Green Tea Tree
(*Pittosporum phillyreoides*)	Weeping Pittosporum
(*Callitris verrucosa*)	Scrub Pine
(*Acacia obliqua*)	Spoon Acacia
(*Melaleuca pubescens*)	Black Tea Tree.

An effort is being made to catch drift on this badly blown hill by stripping a seven-furrow plough down to front and rear mould-boards, and ploughing as deeply as possible.

Two years ago the writer visited the Northern Territory where he was impressed by the graziers' talk of their top and bottom feed. The bottom feed means the grass and the top feed means the edible trees and shrubs. Perhaps it would be a good idea on a Mallee farm to have a paddock of edible Mallee shrubs to use for drought relief. If planted near the home this would serve the dual purpose of protecting it from the dust as well.

Mr. Zimmer, of the Forests Commission, has provided me with the following list of trees and shrubs suitable for this purpose:—

Native Plants Suitable for Growing as Reserve Fodder Stock.

Atriplex (various species)	(Saltbushes
Rhagodia (various species)	(Saltbushes
Kochia (various species)	(Blue bush)
Chenopodium (various species)	(Goosefoot)
Cassia (various species)	
Myoporum platycarpum	(Sugarwood)
Heterodendron oleifolium	(Cattle Bush)
Casuarina (various species)	(Belar, Buloke, &c.).

Native grasses probably will appear naturally without sowing seed, and the same applies to many annual species of indigenous herbage. The importance of fencing to protect the plants against rabbits and stock cannot be over-emphasized.

Information regarding these trees and shrubs may be obtained from the office of the Forest Commission at Mildura.

Fallowing is not the only cause of drift—overstocking, especially with sheep, is another. A run of good seasons comes along and a farmer, trying to make up for the loss in the lean years, stocks to capacity. Suddenly a dry year catches him overstocked, and without a reserve of hay on hand. The sheep eat the land bare and leave it in such a condition that the first wind storm blows away the valuable top soil. The wisest plan is never to stock over the average season carrying capacity, and to conserve fodder in the good years for the lean ones to come.

Mr. Clugstone, near Warracknabeal, made 50 tons of barley stack silage this year; a good standby for a dry season.

Last year two of the competitors, Messrs. Schack and Sinclair, of Swan Hill, had big reserves of hay, and though there was a severe drought in Swan Hill, Mr. Sinclair was getting very high prices for fat stock. Both, however, lost heavily at lambing time.

The following experiment reported in Circular No. 9 of the Council for Scientific and Industrial Research indicates that these losses may easily have been prevented.

In September, 1939, twelve ewes with lambs only a few weeks old were placed on the following ration:—44 per cent. wheaten chaff, 25 per cent. bran, 25 per cent. oats, 5 per cent. linseed, 1 per cent. common salt. Six more ewes and lambs received the same ration with the addition of 1 per cent. finely ground limestone. All animals were given as much as they would eat. The lambs were weaned in November, 1939. In December, 1941, 27 months after the experiment started, all the weaners and ten of the twelve ewes in the first flock had died. Every one of the flock that had the 1 per cent. of limestone added to the ration, however, lived and put on weight.

It is a well known fact that clovers are a wonderful soil renovator; originally there were no clovers in the Mallee, but that they will grow there has been proved at Murrayville by Mr. Meagher's barrel clover. Last year both Mr. Brydon and Mr. Sinclair, of Swan Hill, had a lot of trefoil clover, and this year Mr. Staples had a paddock of cluster and woolly clover, and Mr. Hatcher, of Goyura, also had some woolly clover. Mr. Hatcher had sown some of his light sand hills with lucerne which was doing very well.

Mr. R. P. Kelly, at Kunat, had a paddock of lucerne that had been established for seven years and was still quite good, and had recently sown another paddock. Mr. Hatcher was of the opinion he would have to crop less and graze more, and had sown 1 lb. of Wimmera rye grass to the acre with his wheat in one paddock. This had struck well and the seed from it should grow good feed this year.

Farmers in the Mallee should sow a trial area with different clovers to test out their country. If only ½ lb. of clover seed to an acre were sown with the wheat, cluster clover ½ lb. to the acre would be about twelve seeds to the square foot. It generally sells about 9d. a lb. Trefoil may be sown at about 1 lb. to the acre; the seed is larger but the price is about the same. Barrel clover is dearer, but it is a good idea to try it and some lucerne on the sand hills, but do not sow more than 2 lb. to the acre.

The results will be interesting, and maybe you will find something well worth while and it will not cost much in any event. Of course, we know that clovers want superphosphate to get the best out of them, and that super. is hard to get, but try it out and rye corn too. I have seen the latter growing on badly blown hills where nothing else would grow, and also on blown-sand feet deep. It is a good winter grower, stock like it, and it comes in early.

Mr McDonald, of Nyarrin, showed a very nice crop of Sudan grass, and another of maize, on a light drifty hill. This would be very handy in the autumn when the ewes started lambing.

There were 33 farms in the competition; the approximate area judged was 40,000 acres scattered over seven shires.

In the first judging 33 farms were judged, and I wish to congratulate Messrs. Sims, Blackburn, and Webb, of the Department of Agriculture, on their judging. Their notes were very comprehensive and valuable.

Another view of the field illustrated on the previous page. Soil has been trapped and held by the furrows.

The second judging of 23 farms was done by the writer. The entrants had made a good effort, and in doing this they are doing a job of great national value in trying to save the nation's greatest heritage—the soil. I feel that between them, the competitors will find ways to do this.

I wish to thank the donors of the prize money, who, at the present time, have so many calls on their generosity;

[*Continued on page 532.*

RESEARCH BARLEY

A NEW VARIETY

By ALAN R. RAW, M.Agr.Sc.,
Cereal Geneticist

Research is a new variety of malting barley which has been developed by the Department of Agriculture at the State Research Farm, Werribee. It has proved superior in yielding ability to the established varieties, Prior and Plumage Archer, and produces a grain of excellent malting quality, being superior to Prior in this regard. Research is recommended for sowing in the Central, Gippsland, and North-eastern districts of Victoria. Limited quantities of seed will be available for distribution to farmers this season.

RESEARCH barley originated as a cross between the two most popular standard varieties Prior and Plumage Archer. The mating was made at the State Research Farm, Werribee, in 1931, with the object of developing a variety, which would combine the earliness of maturity, and yielding ability of Prior, with the superior inherent malting quality of Plumage Archer. The new variety, which was selected for yielding ability and high quality of grain, exhibits the more desirable characteristics of each of its parents.

Heads of the new variety.

Research is a typical two-rowed or malting barley of the Goldthorpe type, i.e., possessing the large, broad, erect head characteristic of Plumage Archer. It may be classed as an early mid-season variety, maturing some two to three weeks in advance of Plumage Archer, but approximately one week later than Prior. Research has a higher stooling capacity, and produces an ear which is approximately sixteen per cent. larger than that of Prior. It is not likely to suffer excessive storm damage, nor does it exhibit the unfortunate "neck-breaking" habit typical of Plumage Archer. Experience in plots, and in bulk sowings in the Central district, has shown that the variety stands well, is less susceptible to caterpillar attack than Prior, and is less likely to be damaged during harvesting operations. In grain characteristics Research resembles its parent Plumage Archer. The grain is of medium size, thin skinned, rather long and narrow, and about six per cent. lighter than that of Prior. It is characterized by an inherent malting quality approaching that of Plumage Archer.

Yield

Research has demonstrated a definite superiority in yielding ability to existing standard varieties over a period of years at Werribee and in different country centres. (See Tables I. and II. on next page.)

At Werribee, the variety has been under trial since 1935, and during a six-year period, has outyielded Prior by an average of five bushels per acre. Similarly, in trials extending over five years, Research has given an average increase of more than four bushels per acre over Plumage Archer.

TABLE I.—BARLEY VARIETY TRIALS, STATE RESEARCH FARM, WERRIBEE.

Variety.	Yield (Bushels per Acre).							
	1935.	1936.	1937.	1938.	1939.	1941.	Average.	
							5 Years.	6 Years.
Research	23·6	28·2	18·0	30·3	43·4	40·5	30·7	30·7
Prior	18·2	24·1	18·6	28·6	35·9	27·9	24·9	25·6
Plumage Archer	17·8	22·8	15·1	..	30·2	45·5	26 3	..

1940 plots were not harvested.

At Dookie, in the North-Eastern district, Research has given consistently satisfactory results in variety trials, extending over the period 1939-1941, and has outyielded Prior by an average of more than six bushels per acre.

Similar results have been obtained at Longerenong Agricultural College in the Wimmera, where Research showed an average increase of more than five bushels per acre over Prior for the three-year period. In this case, however, results were not so consistent as those obtained at Dookie, a fact which suggests that Wimmera conditions are less favourable to the new variety.

The results obtained at the Mallee Research Station, Walpeup, show that Research is slightly inferior to Prior under Mallee conditions, the difference in yield being about one bushel per acre over the three-year period. From this, it is apparent that the new variety is unable to adapt itself fully to the conditions prevailing in these drier areas, where restricted rainfall, associated with the relatively sudden onset of hot weather, results in the sharp curtailment of the ripening period.

The evidence supplied by these trials, considered in conjunction with supplementary data obtained from bulk sowings in the Central and Gippsland districts, indicates the suitability of Research for cultivation in districts south of the Dividing Range and in the North-East. In these areas of higher rainfall, where conditions during the ripening period are relatively temperate, Research could safely replace either Prior or Plumage Archer in the main sowing.

Under Wimmera conditions, further evidence will be required before any recommendation can be made.

Malting Quality

In assessing the ultimate value of any variety of malting barley, the question of grain quality is of equal importance to yield. Malting quality is extraordinarily complex in nature, and is dependent upon both external and internal factors. The former are both environmental and physical, and vary with season, soil, harvesting conditions, and so on. On the other hand the internal factors are essentially inherited, and are constant for any

TABLE II.—BARLEY VARIETY TRIALS, COUNTRY CENTRES.

Centre.	Variety.	Yield (Bushel per Acre).			
		1939.	1940.	1941.	Average, 3 Years.
Dookie Agricultural College ..	Research	23·9	53·8	65·1	47·6
	Prior	17·9	50·3	55·7	41·3
Longerenong Agricultural College ..	Research	67·2	32·2	55·2	51·5
	Prior	46·3	40·3	52·1	46·2
Mallee Research Farm, Walpeup ..	Research	15·3	12·0	36·3	21·2
	Prior	16·8	12·8	37·6	22·4

Harvesting crossbred barleys, stud cereal plots, State Research Farm, Werribee.

given variety. In this latter aspect, malting quality therefore is under the control of the plant breeder.

It has been found that the most reliable index to malting quality is the amount of nitrogenous compounds present in the grain. These compounds exert a generally deleterious effect upon malting and brewing quality, and hence the lower the nitrogen content of the grain, the greater will be its value to the maltster and the brewer. The reliability of this quality index is demonstrated by the fact that English malting circles consider that a decrease of ·1 per cent. in grain nitrogen content will increase the value of the sample by approximately three pence per bushel.

In view of its significance in relation to malting quality, the grain nitrogen factor was employed as the basis of selection in the development of Research barley, with the result that the new variety resembles Plumage Archer in producing a grain of exceptionally low nitrogen content.

Evidence that this low nitrogen characteristic of Research is indicative of superior malting quality has been furnished by the results of commercial malting tests, conducted on bulk samples of the variety, grown in the Central district during the past four years. Without exception, these have been particularly gratifying, and the reports indicate that Research definitely resembles Plumage Archer in both malting and brewing characteristics, producing a malt which filters more brightly than that of Prior.

These large-scale maltings have also furnished evidence that the variety retains its good quality under unfavourable conditions. During 1939, the bulk areas sown to Research at Balliang, were adversely affected by a dry finish to the season. This resulted in the production of an under-developed grain sample, the unattractiveness of which was accentuated by the long narrow character of the grain. Though officially classed as third grade, the sample yielded a malt which was in every way equal to that produced by any first-grade Victorian or South Australian barley in that season. This fact is of particular interest, since it demonstrates the difficulty of assessing malting quality by visual examination alone.

The work of developing and testing Research barley has been greatly facilitated by the sympathetic co-operation of both maltsters and growers. In this regard, special thanks are due to Mr. J. S. Burston of Barrett Bros., and Burston of Melbourne, who arranged for the sowing of bulk areas, and for the conduct of commercial malting tests with the variety.

Thanks are also due to Mr. J. Mitchell of Smith, Mitchell and Co., Richmond, for assessing the quality of numerous grain samples, and to the following growers for the experimental sowing of bulk areas of Research —Messrs. A. and F. Beggs, Balliang, J. F. Fry, Balliang, D. J. Anderson, Denison, and J. H. Harris, Clydebank.

. . . ECONOMY

In Use of Veterinary Preparations

THE Minister for War Organization of Industry (Mr. J. J. Dedman) made an Order, dated 9th September, prohibiting canvassing for orders for veterinary preparations of all kinds and limiting the advertising of such goods to announcement of the name and type of product, the price, and the source or sources from which it can be obtained.

The Order also deals with stock-licks and the sale of salt and minerals for live stock. Manufacture for sale of stock-licks is prohibited, and no stock food may contain more than 30 per cent. of salt. Sale of phosphates in any form for sheep is prohibited and salt for sheep can be purchased only after obtaining a permit from the Chief Veterinary Officer of the Department of Agriculture or his deputies.

Such permits may only be given when sheep are fed mainly on cereal grains and salt is required to induce the sheep to consume additional lime in lick forms; when sheep are grazing in areas deficient in cobalt or copper and these minerals have to be supplied in a salt-lick, and finally in such other special circumstances as the Chief Veterinary Officer of any State may decide.

Explaining reasons for this new Order, Mr. Dedman said that there was a good deal of waste in the use of veterinary preparations and the materials used in some of them could ill be spared. Their use, sometimes beyond what is essential and the laying in of stocks against a possible shortage later, was encouraged by advertisement and salesmanship.

"Many of the firms concerned," Mr. Dedman said, "have already cut down their advertising and reduced their staffs of salesmen, but others still continue. Some advertising is necessary so that those who have real need of veterinary medicines and the like may know where to obtain them. This is provided for in the Order."

Referring to the restrictions placed on minerals for live stock, the Minister emphasized that the prohibition of manufacture for sale of stock-licks would not prevent owners from obtaining such salt and minerals as may be necessary for the health and productivity of live stock. On the other hand, all unnecessary and wasteful use of licks must cease in the national interest.

"There is no evidence," he said, "that under Australian conditions the iodine, sulphur, and certain other minerals often included in proprietary mineral licks, are of the slightest value."

The Order refers especially to phosphates and salt for sheep. Mr. Dedman referred to exhaustive experiments by the Council for Scientific and Industrial Research and other authorities, showing that additional phosphate in bone or mineral form is of no value to sheep. Phosphates were urgently needed as fertilizer, and it would be unreasonable to continue wasting them in sheep-licks.

"Thousands of tons of salt are harvested and transported annually for sheep," Mr. Dedman added, "yet there is no evidence that sheep require salt except as an inducement to take minerals such as lime, copper, or cobalt, of which they may be short under certain conditions and in certain well-known localities."

"The feeding of salt to sheep is a very old custom, and many graziers in recent years have made a habit of feeding phosphates as well. It should reassure them to learn that the restrictions now imposed have been approved by the Chief Veterinary Officers of every State, and by the Division of Animal Health and Nutrition of the Council of Scientific and Industrial Research."

"Salt and minerals can still be purchased as required for live stock other than sheep, and advice can be freely obtained from any live stock officer of any State Department of Agriculture on the preparation and use of simple home-made licks."

School of Dairy Technology and Dairy Research Institute

Report for Year Ended 30th June, 1942

By T. M. JENSEN, B.Agr.Sc., (N.Z.) Principal, School of Dairy Technology, Werribee

The School of Dairy Technology and the Dairy Research Institute, Werribee.

THE Victorian School of Dairy Technology and the Dairy Research Institute were established by the Department of Agriculture in 1939 with the object of providing a State centre for instruction and research in dairy technology. The School is situated on the State Research Farm at Werribee where special buildings have been erected for its accommodation. In addition to suitably equipped lecture rooms and laboratories, a small-scale dairy factory, designed for different forms of manufacture and equipped with the most modern type of plant, has been provided. Excellent facilities are therefore available for instruction and research in dairy manufacture.

The School and associated Dairy Research Institute are staffed by a team of five technical officers, one practical buttermaker and cheesemaker, one general assistant, a laboratory assistant, and a typiste. The technical staff is comprised of graduates in agricultural science and biochemistry. In a normal year, this staff is occupied for about one-third of its time with teaching duties and for the remainder with laboratory service work to dairy factories and research into dairying problems of a local nature. The present report is a summarized statement of work performed during the year ended June 30th, 1942.

During the year, the second group of students to commence the diploma course in dairy manufacture since the inauguration of the course in 1939, completed their studies and passed out from the school. Six of them gained diplomas.

Fresh applications for the diploma course were not accepted this year owing to the disturbed conditions created by the war. Instead, special short courses in milk and cream testing, buttermaking, and cheesemaking were held and these were well attended. The response to courses of this type has been such that it is probable they will become a regular feature of the school curriculum.

LABORATORY SERVICE AND CONTROL WORK

Laboratory service and control work are carried out primarily for the purpose of assisting factory inspectors, dairy farm supervisors, manufacturers, and others connected with the handling of dairy produce, to trace and eliminate faults in quality. In addition certain requisites such as starter cultures are made available and technical assistance is given to dairy factories not otherwise catered for in this respect.

(a) Supply of Starter Cultures to Cheese Factories—(W. C. T. Major)

An increasing number of factories, both within and beyond Victoria, are availing themselves of the starter culture service. In addition, starter cultures are being supplied to private service laboratories for redistribution to factories. Altogether 320 cultures were sent out during the year. These consisted of two types, namely, mixed-strain cultures, and single-strain cultures. Although the latter type gives more vigorous acid production in the cheese vat while working normally, most factories have shown a preference for mixed-strain cultures owing to the greater difficulty experienced in maintaining single-strain starters in the cheese factory. A special bulletin, dealing with the care and management of starter cultures in cheese factories, was issued during the year.

(b) Bacteriological Examinations on Samples of Milk, Cream, Water, Butter, &c.—(R. H. N. Trembath)

(i) Water Supplies.

Evidence accumulated by the laboratory over the last few years has indicated that the majority of the bacteriological defects encountered in Victorian butter are brought about by certain water bacteria, more especially certain species of the genus *Pseudomonas,* which usually gain entrance to the product through the use of untreated water in the factory. These findings have focused attention on the quality of farm and factory water supplies, and at the beginning of the 1941-42 season a survey was begun on the bacteriological quality of treated and untreated water supplies to dairy factories throughout the State. To date, a total of 440 samples, representing supplies from approximately 100 factories have been examined and recommendations regarding the treatment of the waters have been made to the Dairy Factory Inspection Branch and to the dairy companies concerned. The general conclusion arrived at from this survey is that *Pseudomonas putrefaciens,* the organism responsible for the notorious "rabbito" or surface-taint defect in butter, is a common inhabitant of Victorian natural water supplies and is often present also in town water supplies, which presumably comply with the standards laid down under the Health Act for potable water. Chlorination of all water used in the factory either for rinsing equipment or washing the butter has therefore been recommended as a safeguard against outbreaks of the surface taint defect.

(ii) Butter Samples.

As a guide to the sanitary conditions surrounding the manufacture of butter in various factories, samples of butter were periodically drawn on the Melbourne grading floors for microbiological examination, reports being furnished to the Dairy Inspection Branch and to the factories concerned. Of a total of 222 samples of butter examined in this way, 12 per cent. were found to be of Class A standard, 18 per cent. were of Class B standard, and the remaining 70 per cent. were of Class C standard. The basis of classification used was as follows:—

—	Bacteria.	Yeasts and Moulds.	Liquefiers.
Class A ..	0–5,000	0–30	0–300
Class B ..	5–25,000	30–100	300–15,000
Class C ..	Below Class B standard.		

It should be noted that the percentages given above are not representative of the bacteriological quality of Victorian butter as a whole since there is a natural tendency in control work of this kind to concentrate on the poorer-class factories.

(iii) Miscellaneous Bacteriological Examinations.

Miscellaneous samples, submitted mostly for partial analysis, included 50 milk, 15 cream, 4 rennet, and 2 whey samples. Complete bacteriological plant surveys were made at two dairy factories on behalf of the Dairy Factory Inspection Branch.

Staff and students, Short Dairy Course, 1942.

(c) Chemical Examinations on Dairy Products, Water Samples, Factory Requisites, &c.—(A. G. Itzerott and J. A. Payne)

(i) Copper and Iron Determinations on Butter.

Owing to the profound effect of small quantities of dissolved copper and iron upon the keeping quality of butter, analyses for copper and iron content were made on samples of butter collected periodically at the grading floors. A total of 72 samples, representing the outputs from 51 butter factories, were examined during the year and reported upon. Of these, 4·5 per cent. contained more than 0·2 parts per million of copper and 13·6 per cent. contained more than two parts per million of iron. The standards mentioned have been shown by previous work at this institution to be the maximum amounts of copper and iron compatible with good keeping quality during storage for a period of three months at 14° Fahrenheit.

(ii) Cheese Samples.

Complete analyses were made on samples of cheese obtained from all cheese factories in the State. The sampling was so arranged that at least one sample was obtained each month from each factory. In all, 163 samples of cheese were analysed for fat, moisture, and salt content and a pH (acidity) determination was also made on each sample. The results are summarized in the table at the foot of this page.

The most significant point arising out of this work was the wide variation in salt content which occurred from batch to batch in the outputs of certain factories compared with the relatively constant salt content in the outputs of other factories. Comparison of grade scores with figures for composition confirmed the view that a high proportion of salt relative to moisture in cheese is generally accompanied by harsh or excessively firm body, while a low proportion of salt to moisture usually results in weak or pasty body. Samples of normal-bodied cheese had a mean salt content of 1·58 per cent. When the salt content was calculated

Percentage Fat.		Percentage Moisture.		Percentage Salt.		Percentage Fat in Water-free Substance.	
Range.	No. of Samples.	Range.	No. of Samples.	Range.	No. of Samples.	Range.	No. of Samples.
%		%		%			
29·9 and under	3	29·9 and under	3	0·9 and under ..	3	49·9 and under ..	12
30–31·9 ..	9	30–31·9 ..	15	1·0–1·19 ..	11	50–51·9 ..	34
32–33·9 ..	32	32–33·9 ..	60	1·2–1·39 ..	33	52–53·9 ..	42
34–35·9 ..	53	34–35·9 ..	59	1·4–1·59 ..	49	54–55·9 ..	26
36–37·9 ..	30	36–37·9 ..	25	1·6–1·79 ..	34	56–57·9 ..	13
38–39·9 ..	12	38 and over ..	2	1·8–1·99 ..	29	58–59·9 ..	12
40–41·9 ..	14	..	..	2·0 and over ..	6	60–61·9 ..	12
42 and over ..	12	..	..	..	..	62 and over ..	13
Mean fat 36 per cent.		Mean Moisture 34·2 per cent.		Mean Salt 1·52 per cent.		Mean Fat in Water-free Substance 55·2 per cent.	

as a percentage in the cheese moisture $\left(\frac{\text{salt content}}{\text{moisture content}} \times 100\right)$ the average figure for normal-bodied cheese was 4·6 per cent. The pH of all samples ranged from 4·86 to 5·26 with a mean value of 5·09. In several samples, the proportion of fat in the water-free substance was below the legal minimum of 50 per cent., indicating faulty standardization in the factory.

(iii) Miscellaneous Chemical Examinations.

These included 69 pH (acidity) determinations on butter, as a check on the accuracy of cream neutralization in butter factories, titrations on twenty samples of standard alkaline solution submitted by factories for check testing, complete analyses on 23 samples of butter and moisture determinations on 235 samples of butter submitted in connexion with the Factory Managers' Association Annual Butter Competition.

(d) Testing of Dairy Equipment

Two new items of dairy factory equipment were tested on behalf of the manufacturers, and reported upon.

(e) Information Service

Answers were supplied to a number of enquiries for information on technical matters associated with the manufacture of dairy products.

RESEARCH WORK

Problems affecting the manufacture of dairy products were kept constantly under review and, where circumstances warranted, investigations were undertaken with the object of providing new information which would be of benefit to manufacturers.

Butter investigations undertaken included:—

(*a*) The influence of the curd content of butter upon butter quality and yield.

(*b*) The influence of various manufacturing practices on the oxidation of butter-fat during the cold storage of butter.

(*c*) An examination of a new technique for the detection in water supplies of organisms responsible for the surface taint or "rabbito" defect in butter.

Cheese studies comprised:—

(*a*) The selection of various strains of lactic streptococci for use in cheese starters.

(*b*) An attempt to develop a new method for propagating starters in cheese factories which would be simple in operation and give adequate protection against contamination of starters by extraneous organisms and air-borne bacteriophage.

(*c*) An investigation of the origin of bacteriophages active against starter organisms in cheese factories.

(*d*) Practical trials in the treatment of milk for cheesemaking in a direct-steam vacuum pasteurizer.

(*e*) The control of mould growth on the surfaces of cheese during the curing process.

Casein investigations were confined to:—

(*a*) A study of the bacteriology of starters suitable for the production of a floating curd in the manufacture of lactic casein.

Part of the investigations on the curd content of butter were carried out with the assistance of the Trafalgar Milk Supply Proprietary Limited and the Geelong Co-operative Dairy Company. Commercial trials on the vacuum pasteurization of milk for cheesemaking were made at the Alvie Butter and Cheese Factory and some preliminary trials with a labour-saving method of cheesemaking were made at the Longwarry and District Dairymen's Co-operative Association. The Department is indebted to the proprietors, directors, and executive officers of these companies for their valuable assistance.

A summary of the results achieved during the year on the respective research projects is given in the following statement.

Buttermaking Projects

(*a*) The Curd Content of Butter.—(T. M. Jensen, W. J. Wiley, R. H. N. Trembath, and A. G. Itzerott.)

An investigation was made of the influence of manufacturing methods upon the curd content of butter and of the effect of curd content upon the keeping quality of butter. By modifying the ordinary method of manufacture it was found that the curd content could be increased to a maximum of about 1·5 per cent. as compared with an average of 0·9 per cent for

control butters manufactured by the ordinary method. This increase is sufficient to have an appreciable effect on factory over-run. There was no evidence that the incorporation of a high proportion of curd has an adverse effect on the keeping properties of well-made butter.

Confirmation of these results was later obtained by a somewhat different method. By a patented process recently introduced into a local butter factory, high fat-content cream previously standardized to the composition desired in the finished butter can be converted directly into butter by bringing it into sudden contact with low-temperature rollers. The product is then subjected to a very effective working process which results in an exceptionally good dispersion of the buttermilk throughout the butter. Observations in this laboratory have shown that while the curd content of butter made by this method is usually in the vicinity of 1·5 per cent, the keeping qualities of the butter are exceptionally good. This substantiates the previous finding that, provided butter is worked to a good texture, variations in curd content do not affect the keeping quality.

(*b*) The Oxidation of Butterfat during the Cold Storage of Butter.—(T. M. Jensen, A. G. Itzerott, and J. A. Payne.)

With improvement in the sanitary conditions surrounding the manufacture of butter, defects of bacteriological origin are becoming relatively less important than deterioration due to chemical causes. This is especially true in the case of cold-stored butter which is held at temperatures too low for bacterial growth but not low enough to prevent the progress of chemical changes entirely. If butter is required to be held in cold storage for several months, oxidative changes in the butterfat may proceed far enough to cause flat, stale, metallic, oily, and even tallowy flavours to appear in the butter before it is consumed. Previous work at this Institute has been devoted to establishing to what extent metallic contamination and low pH values were responsible for changes of this type occurring in Victorian butter. During the year under review this work was extended to define the influence on butterfat oxidation of the following factors:—(*a*) treatment or conditions to which cream is subjected prior to pasteurization; (*b*) temperature of vacreation (as distinct from ordinary flash pasteurization) used in the treatment of the cream; (*c*) the addition of starter to the cold cream after pasteurization; (*d*) the effect of high as well as low pH in the butter serum; (*e*) the percentage of salt in the butter and the degree of dispersion of the salt throughout the butter; (*f*) the exposure of the butter to light during the packing operations; (*g*) washing of the butter granules in water containing varying amounts of chlorine.

These studies took the form of practical buttermaking trials in which two batches of cream originally taken from the same bulk were treated and manufactured into butter under identical conditions except in respect to the factor under investigation. After storage at 14°F. for a period of three to four months the degree of fat oxidation in control and experimental batches is being compared by means of fat aldehyde and peroxide values determined on the fats. Each experiment has been repeated a sufficient number of times to ensure that the results obtained will be reliable. Results so far available provide information on (1) the effect on fat oxidation in the butter of Vacreating cream at 185 to 190°F. as compared with 200 to 205°F. and (2) on the influence of adding small quantities of starter (up to half of 1 per cent.) to the pasteurized and cooled cream fifteen to eighteen hours prior to churning, and holding at a temperature low enough to prevent any increase in acidity until the cream is churned. In twelve comparisons, butters made from creams Vacreated at 185-190°F. showed distinct oxidation after storage for three months at 14°F., whereas butters from creams Vacreated at 200 to 205°F. showed no oxidation. The average fat aldehyde value for the low-temperature series was 1·0 units (Schibstead) as against a value of 0 units for the high-temperature series. Most of the butters in the low-temperature series were commented upon for oily and metallic flavours and graded one-half to one point lower than the high-temperature series after removal from storage. In eleven comparisons, butters made from creams to which 0·5 per cent. of starter had been added after pasteurizing and cooling, showed no more oxidation after three months' storage at 14°F. than the control butters. Fat aldehyde values were negligible on control and experimental butters alike. There was, however, a distinct difference in the gradings for the two classes of butter both before and after storage, the starter butters being commented upon for their full and pleasant flavour and grading an average of half a point higher than the non-starter series after removal from storage. It is interesting to note that these butters were all made from sour neutralized creams.

At the time of writing, butters representing the remainder of the work on this project were not due for removal from storage.

(*c*) Examination of a New Technique for the Detection of Pseudomonas Putrefaciens in Water Supplies and Dairy Products.—(T. M. Jensen and R. H. N. Trembath.)

An examination has been made of a technique recently developed in Canada (Linneboe Sc.Agr., Nov., 1940.) for the detection in water samples of organisms responsible for the surface taint or "rabbito" defect in butter. The method consists of plating the sample on a special medium prepared by adding a solution of ferric ammonium citrate to nutrient agar at the time of pouring. *Ps. Putrefaciens* colonies show up as pitted or slightly sunken colonies on the surface of the agar. Isolations from these colonies when inoculated into butter have invariably produced the "rabbito" taint. In examining water supplies, plates prepared from an enrichment of the water samples in litmus milk have sometimes revealed the organisms when plating direct from the water sample has failed to do so. This new technique fills a long-felt want for a simple and reliable method of detecting organisms of the *Ps. Putrefaciens* type in water and dairy products.

Cheese Projects

(*a*) Selection of Strains of Lactic Streptococci for Use in Cheese Starters.—(T. M. Jensen and W. C. T. Major.)

Work during the past year has indicated that lactic streptococci for use in cheese starters should be selected upon the following basis:—(1) vigour of acid production in the cheese vat; (2) susceptibility to bacteriophage attack in the cheese factory; (3) ability to maintain full vitality over long periods of propagation in milk or other media.

(i) Differences in vigour between different strains are noticed chiefly during the later stages of cheese manufacture, some strains developing the desired final acidity in the curd only with difficulty. This has been shown by workers in other localities to be due to the fact that some strains are more seriously inhibited by the cooking temperatures employed in cheesemaking than are others. In view of the fact that Str. Lactis will tolerate temperatures in excess of 97°F. better than will *Str. Cremoris* it seems surprising that the majority of single-strain cultures in use in Australia and New Zealand are strains of Str. Cremoris. An active acid-producing strain of Str. Lactis obtained from Queensland has been found in this laboratory to withstand cooking temperatures of 104°F. without loss of vitality in the subsequent stages of manufacture.

(ii) Experience in the distribution of several single-strain starters to cheese factories has indicated that some strains are more susceptible to bacteriophage attack than others. A possible explanation for this will be discussed later under (*c*).

(iii) Under ordinary laboratory conditions of propagation active single-strain cultures of lactic streptococci selected for use in cheese starters all show a tendency to fade in vitality over a longer or shorter period of time. In the case of some strains this tendency can be offset by periodical plating and selection of active colonies, but with others the tendency to fade is so strong that even frequent plating and selection of colonies will not prevent a weakening-off in the acid-producing power of the culture. It has been observed that this change in the vitality of the culture is often accompanied by a change from smooth to rough colonies on solid media.

(*b*) Method for Propagating Starter Cultures in Cheese Factories.—(T. M. Jensen.)

Research in the subject of starter propagation in cheese factories has shown, especially in New Zealand, that successful propagation is very largely a matter of protecting the culture effectively from air-borne bacteriophage originating from the cheese vats in the factory.

One proposal for avoiding the danger due to air-borne bacteriophage is to erect a detached starter-room at some distance from the factory and of such construction that air-borne bacteriophage cannot penetrate into it. In this laboratory an attempt was made during the past year to develop a method of propagation, which, if successful, would not only protect the starter from extraneous organisms and air-borne bacteriophage, but also greatly reduce the work involved in the ordinary system of preparing separate mother cultures. The device used in these experiments consisted essentially of a glass tube passing through the lid of the can in which the bulk starter was grown, the tube being attached to the lid itself by means of an air-tight seal. The upper end of the tube was plugged with a cotton-wool filter, while the lid of the can (8-inch diameter)

was rendered air-tight by means of a rubber washer and screw clamps. In using this outfit for the propagation of starter the lid was clamped down before sterilizing the milk and the can was not again opened to the air until some of the clotted starter had been drawn up into the tube on the following morning. The lid with tube attached was then placed on one side until the can had been emptied of starter and re-charged with milk. Contamination of the lower end of the tube was considered to be of no importance since this was subsequently subjected to the same sterilizing treatment as the milk. After sealing the lid, sterilizing the can by heating in boiling water and cooling by standing in cold water, the culture in the upper part of the tube was allowed to flow down into the can thus inoculating another batch of milk. The effect of this practice was that a small quantity of culture was carried over in the upper part of the tube each day where it remained intact during the sterilizing of the next batch of milk, although culture in the lower part of the tube was destroyed. At no time was the culture in the upper part of the tube exposed to the atmosphere nor allowed to come in contact with the next batch of milk until this had been sealed off from the atmosphere and sterilized.

Tests with this method lasting over a period of fifteen days were carried out in a room in which the atmosphere was kept laden with bacteriophage by atomizing phage suspension through a spray pump. Another can of the same starter and a flask of mother culture were propagated in the same room in the ordinary manner to serve as controls. Examination of the cans and flask each morning after incubation over-night, showed that the can and flask culture which were propagated by the ordinary method, had always failed to clot owing to complete lysis of the organisms, while the can culture, propagated by the experimental method, clotted normally and remained free from bacteriophage. At the end of fifteen days the results were considered to be conclusive. Several problems in design would have to be overcome before this device could be put up in a form suitable for general use in factories, but the idea is recommended to the attention of dairy machinery manufacturers.

(*c*) Origin of Bacteriophages Responsible for Starter Failures in Cheese Factories. —(T. M. Jensen.)

Experiments have shown that when certain strains of lactic streptococci are grown in flasks of sterilized milk, filtrates from cultures to which a few drops of rennet have been added at the time of inoculation, often contain bacteriophage whereas filtrates from cultures containing no rennet do not contain bacteriophage. Evidence has been obtained suggesting that the phage is released from "carrier" organisms in the culture by the action of the rennet. It would appear that the phenomenon described is probably responsible for initiating the sequence of events described by Whitehead and Hunter (J.D. Res. Vol. 12, p. 63) leading to the presence of air-borne bacteriophage in the factory building.

(*d*) Treatment of Milk for Cheesemaking in a Direct-Steam Vacuum Pasteurizer. —(T. M. Jensen and A. G. Itzerott.)

Practical trials have been commenced to ascertain the effect of pasteurizing milk for cheesemaking in a direct-steam vacuum pasteurizer as used in butter factories for the treatment of cream for buttermaking. Special attention is being devoted in this study to the following points:—(*a*) removal of feedy and other taints from the milk; (*b*) destruction of bacteria and enzymes; (*c*) effect upon cheesemaking processes; (*d*) degree of dilution of the milk with condensed steam; (*e*) losses of cheese constituents in the whey; (*f*) total effect on cheese quality and yield.

Results so far available from this work indicate that the practice is not without promise.

(*e*) Control of Mould Growth on the Surfaces of Cheese During the Cheese Maturing Process.—(W. C. T. Major and T. M. Jensen.)

Experiments have been made with the application of various substances to the rind of cheese to prevent the growth of moulds thereon during the cheese-maturing process. Some of the substances tried proved very effective under the conditions of the experiment. Publication of the results is awaiting a ruling from the Pure Foods Standards Committee regarding the legal aspect of applying these substances to the rind of cheese.

Casein Investigations

Starter Cultures for the Manufacture of Lactic Casein.—(T. M. Jensen and W. C. T. Major.)

In the manufacture of lactic casein from soured skim-milk, considerable importance is attached by some manufacturers to obtaining a curd which will float during the cooking process instead of sinking to the bottom of the vat.

Floating curd is said to cook better, to cause less difficulty in handling and to result in a better type of product than "sunken curd." Although it has been recognized for some time that the floating or sinking of the curd in casein making depends upon the starter used in souring the milk, no explanation has been forthcoming as to why certain starters should give a floating curd and others a sinking curd. Since the specific gravity of curd that is free from gas bubbles is greater than that of whey it is obvious that floating curd must be buoyed up by bubbles of enclosed gas. The question therefore was, why do some starters produce more gas in the casein vat than others?

In the manufacture of cheese from rennet curd, floating curds have been traced to contamination of either the milk or the starter with coliform organisms which are capable of producing large amounts of gas from milk sugar. This had led to the suggestion that floating curd in casein-making is also caused by the use of a starter contaminated with coliform organisms. Examination of a starter which was producing good results in the casein vat did not support this view but showed that it contained, in addition to organisms of the *Str. Lactis* type, an unusually large proportion of another class of lactic acid bacteria, known as betacocci. The latter organisms are able to grow actively in milk once it has clotted, producing considerable quantities of gas which is chiefly carbon dioxide. Tests in a glass beaker showed that the carbon dioxide remains chiefly in solution until the curd is broken up and heated. On heating, the gas is forced out of solution in the form of visible bubbles and causes the curd to float. On this basis, a beaker test has been devised for testing the suitability of starters for casein-manufacture.

Some artificially-prepared mixtures of *Str. Lactis* and *Betacocci* have given good results both as gas formers and acid producers and have been favourably commented upon by casein makers. Single-strain cultures of Str. Lactis or *Str. Cremoris* are, of course, unsuited for this purpose.

Study is now being devoted to the effect of methods of propagation upon the stability of mixed cultures suitable for casein-making.

Publications Issued During the Year

Title.	Author.	Journal.
The Sectional Contamination Defect in Butter	T. M. Jensen..	Jnl. Agric., Vic.
The Neutralization of Sour Cream for Butter-making	F. S. Newman and W. J. Wiley	Jnl. Agric., Vic.
Summer Defects of Cream	R. H. N. Trembath	Jnl. Agric., Vic.
The Selection and Maintenance of Starter Cultures for Cheese-making	T. M. Jensen..	Jnl. Agric., Vic.

Staff Changes

J. A. Payne, Esq., B.Agr.Sc., was appointed to the Staff in December, 1941, as Assistant Dairy Technologist.

W. G. Crewther, Esq., M.Sc., was appointed to the Staff in May, 1942, as Biochemist.

SOIL DRIFT CONTROL—*continued from page 520.*

to give so liberally shows a fine public spirit and a knowledge of the need for action.

In conclusion, the writer appeals to Mallee farmers to give the competition their future support, so that our investigations can be carried on to a successful conclusion.

Canada has suffered greatly from soil drift, and scientists there estimate that a dust storm a mile long, a mile high, and a mile wide will contain 225 tons of soil.

An inch of soil off an acre of land would weigh 156 tons. It would contain—5,380 lb. of potash, 694 lb. of nitrogen, and 155 lb. of phosphorus—sufficient phosphorus to grow 485 bushels of wheat.

When you see your land drifting and blowing away, this will give you some idea of what you are losing and the necessity of adopting some methods to prevent this serious loss of your soil.

THE FERTILIZERS ACT

Analyses of Samples Collected—Season 1941

By W. C. ROBERTSON, Chemist

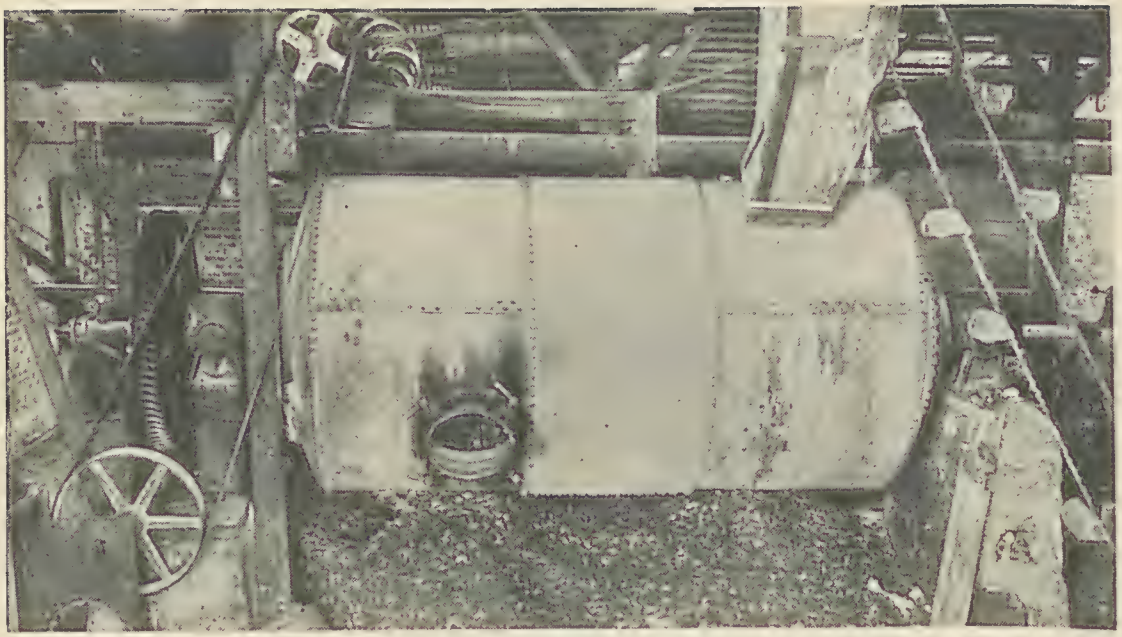
THE table at the conclusion of this article shows the analysis results of samples of fertilizers collected and taken under the provisions of the Fertilizers Act from stocks in stores and factories within Victoria during 1941 and also gives the analyses guaranteed by the manufacturers. So that comparison may be made at a glance the analytical figures as found by the analyst are set out in bold type.

Of the samples collected more than fifty per cent. consisted of blood and bone (animal fertilizer), and approximately three out of every four consisted of or contained some of this class of fertilizer. It must not be assumed, however, that animal fertilizers are the most extensively used nor is it to be concluded that they are the most popular.

The tonnage of animal fertilizer (blood and bone) used annually by the farmer in Victoria is less than five per cent. of the total fertilizer utilized, in spite of the fact that animal fertilizer is not rationed.

It is necessary to explain that the name "blood and bone" is a misnomer. Contrary to common belief, the fertilizer is not a blend of blood manure and/or dried blood with bone dust. For many years this term has been given to animal fertilizer produced by freezing works and noxious trade mills from slaughter-house refuse, the carcasses of beasts which have either died naturally or by accident, or from premises holding a knackery licence, which permits the slaughter of livestock such as old and worn out horses. Freezing works and abattoirs collect and treat the blood flowing from the slaughtered beast separately, to produce dried blood (an important poultry food) or blood manure, which is too impure for use as a food. Containing little or no phosphoric acid, blood is not largely used as a fertilizer in Victoria. The dead beast or butchers' bones and offal are treated by either the wet or dry-rendering process to produce the fertilizer generally termed "blood and bone". In other parts of the world it is termed tankage,

Storage and bagging shed at a modern tankage fertilizer works.



Emptying animal fertilizer out of a dryer at a country mill.

and consists of a varying mixture of cooked *meat and bone.* In early times "blood and bone," designated a "smelly" fertilizer, was made from putrid carcasses treated by the wet-rendering process, but in recent years this process is being replaced by the dry-rendering method, the fertilizer from which is generally and correctly termed "animal fertilizer".

As shown by the analysis, as long as no blending or mixing is practised, the fertilizers blood and bone or animal fertilizer can be safely regarded as one and the same, irrespective of smell and appearance. The only method of evaluing animal fertilizer is from the registered analysis which appears on the label attached to the bags containing the fertilizer.

With conditions as at present existing, animal fertilizer would be a valuable help to many intense culturists who have made a practice of using this type of fertilizer—a practice based on years of experience, and it is singularly unfortunate that the fertilizer is in short supply particularly as no substitute of any kind is available. The shortage in Victoria has been greatly accentuated by increased export to other States to meet the requirements of market gardeners in increased vegetable production.

During the year 1941 only one parcel of fertilizer was found to infringe the Act (see analysis in the table), and a successful prosecution ensued. The fertilizer was manufactured in another State and consisted of a bone dust of moderate quality which was registered, labelled, and sold as a blood and bone of good quality.

It is essential that proposed purchases of any fertilizer which is being retailed under a new brand, or with extravagant claims as to its efficacy as a growth promoting agent, should be carefully considered and, if deemed necessary, referred to the Chemist of the Department of Agriculture, Melbourne, for advice on quality and price.

During the year many minor infringements of the Act were detected. One instance of the delivery on a farm in the country of a parcel of mixed fertilizer violated the Act in various ways, besides being of poor quality. Fortunately for the manufacturer concerned the fertilizer was in the possession of the farmer and therefore not under the jurisdiction of the Department. However action was taken which resulted in the farmer receiving satisfaction.

Delivery on the farm by a manufacturer is unusual. In this particular case the fertilizer was sold at the retail price per ton registered under the Act, which means free on rail Melbourne or at the railway station nearest the place of manufacture. Under the Act freight or transport is an extra charge on the consumer, and therefore where the manufacturer omits this charge and agrees to deliver fertilizer over a distance of 20 miles by motor truck, the quality of the fertilizer should be carefully checked even to the extent of submitting a sample to the Departmental Chemist for report.

RESULTS OF ANALYSIS OF SAMPLES OF ARTIFICIAL FERTILIZERS COLLECTED IN VICTORIA DURING THE 1941 SEASON UNDER THE PROVISIONS OF THE FERTILIZERS ACT 1928 (No. 3680).

Bottle Label Number.	District in which Sample was Obtained.	Brand and Description of Fertilizer.	Analysis as Guaranteed by Manufacturer or Found by Chemist.	Nitrogen.				Phosphoric Acid.				Potash as Sulphate.	Manufacturer or Importer.
				As Ammonia.	As Blood, Bone and Flesh.	As Flesh, Bone, Hoof, and Treated Leather.	Total Nitrogen	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.		
				%	%	%	%	%	%	%	%	%	
1963	Irymple ..	H.C.P. No. 11 Animal Fertilizer	Guaranteed	..	5·00	..	5·00	..	4·00	6·00	10·00	..	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-street, Melbourne
			Found ..	..	7·39	..	7·39	..	10·48	4·62	15·10	..	
2012	Mildura ..	Fitzroy Blood and Bone	Guaranteed	..	5·50	..	5·50	..	8·00	8·00	16·00	..	W. Angliss Pty. Ltd., 42 Bourke-street, Melbourne
			Found ..	..	7·89	..	7·89	..	7·41	6·00	13·41	..	
2019	Irymple ..	Fertillo Mixed Fertilizer No. 2	Guaranteed	..	..	5·75	5·75	2·00	2·00	6·00	10·00	..	Glues and By-Products Pty. Ltd., Melbourne
			Found ..	..	..	5·80	5·80	1·51	6·18	4·35	12·04	..	
2023	Red Cliffs	Fertillo Mixed Fertilizer No. 2	Guaranteed	..	..	5·75	5·75	2·00	2·00	6·00	10·00	..	„ „ „
			Found ..	..	..	5·85	5·85	1·02	4·26	5·95	11·23	..	
2027	„ „	Sickle in diamond Market Garden Manure	Guaranteed	1·70	1·50	..	3·20	12·40	2·00	2·70	17·10	2·42	Commonwealth Fertilizers and Chemicals Ltd., 65 William-street, Melbourne
			Found ..	2·09	1·25	..	3·34	13·39	1·20	3·14	17·73	2·38	
2034*	Mildura ..	Bryant's Blood and Bone	Guaranteed	..	6·00	..	6·00	..	4·70	7·70	12·40	..	W. E. Bryant, 160 Lane-street, Broken Hill
			Found ..	..	3·82	..	3·82	..	9·82	7·73	17·55	..	
2036	Ballarat ..	Sickle in diamond Sulphate of Ammonia	Guaranteed	20·60	..	..	20·60	..	..	..	..	..	Commonwealth Fertilizers and Chemicals Ltd., 65 William-street, Melbourne
			Found ..	21·00	..	..	21·00	..	..	..	..	..	
2037	Red Cliffs	Cresco Super and Ammonia (3 + 1)	Guaranteed	5·00	..	..	5·00	15·40	·30	·80	16·50	..	Cresco Fertilizers Ltd., Geelong
			Found ..	5·00	..	..	5·00	15·38	·38	·74	16·50	..	
2038	„ „	Dundas' Blood and Bone	Guaranteed	..	4·50	..	4·50	..	7·14	13·61	20·75	..	J. A. Dundas, Dynon-road, Footscray
			Found ..	..	5·36	..	5·36	..	11·60	7·54	19·14	..	
2042	Geelong ..	Corio Blood and Bone	Guaranteed	..	4·00	..	4·00	..	6·00	8·00	14·00	..	The Corio Trading Co. Pty. Ltd., 164 Moorabool-street, Geelong
			Found ..	..	4·46	..	4·46	..	8·34	9·66	18·00	..	
2040	„ ..	Cresco Super and Ammonia (1 + 1)	Guaranteed	10·30	..	..	10·30	10·25	·25	·50	11·00	..	Cresco Fertilizers Ltd., Geelong
			Found ..	9·60	..	..	9·60	11·64	·21	·24	12·09	..	
2041	Ballarat ..	Arch No. 1 Blood and Bone	Guaranteed	..	7·00	..	7·00	..	4·00	5·00	9·00	..	Amalgamated Freezing Co. (Vic.) Pty. Ltd., 54 Market-street, Melbourne
			Found ..	..	6·65	..	6·65	..	4·40	5·30	9·70	..	
2044	Merbein ..	Bendigonian Mixed Fertilizer	Guaranteed	..	4·50		4·50	..	4·80	8·20	13·00	..	Bendigo Fertilizer and Wool Co. Pty. Ltd., Charing Cross, Bendigo
			Found ..	..	4·00		4·00	..	7·96	8·38	16·34	..	
2045	Geelong ..	Cresco 22 Super	Guaranteed	..	..	..	..	20·50	·50	1·00	22·00	..	Cresco Fertilizers Ltd., Geelong
			Found ..	..	..	..	..	21·19	1·45	·60	23·24	..	
2046	Red Cliffs	„ „ „	Guaranteed	..	..	..	..	20·50	·50	1·00	22·00	..	„ „ „
			Found ..	..	..	..	..	21·00	·72	1·06	22·78	..	
2048	Merbein ..	Pannifex's Animal Fertilizer No. 11	Guaranteed	..	5·00	..	5·00	..	4·00	6·00	10·00	..	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-street, Melbourne
			Found ..	..	5·29	..	5·29	..	5·61	6·14	11·75	..	
2053	„ ..	M.S.C. Blood and Bone	Guaranteed	..	6·00	..	6·00	..	4·25	6·25	10·50	..	Mildura Shire Council, Mildura
			Found ..	..	6·47	..	6·47	..	7·53	4·82	12·35	..	
2054	„ ..	M.G. Co. in diamond Sulphate of Ammonia	Guaranteed	20·59	..	..	20·59	..	..	..	..	..	The Metropolitan Gas Co., 196 Flinders-street, Melbourne
			Found ..	20·94	..	..	20·94	..	..	..	..	..	
2055	Footscray	Fitzroy Blood and Bone	Guaranteed	..	5·50	..	5·50	..	8·00	8·00	16·00	..	W. Angliss Pty. Ltd., 42 Bourke-street, Melbourne
			Found ..	..	6·73	..	6·73	..	6·60	5·92	12·52	..	
2056	Irymple ..	Bendigonian Mixed Fertilizer	Guaranteed	..	4·50		4·50	..	4·80	8·20	13·00	..	Bendigo Fertilizer and Wool Co. Pty. Ltd., Charing Cross, Bendigo
			Found ..	..	4·27		4·27	..	7·71	8·81	16·52	..	
2058	Braybrook	Pannifex's Animal Fertilizer No. 11	Guaranteed	..	5·00	..	5·00	..	4·00	6·00	10·00	..	H. C. Pannifex and Co. Pty. Ltd., 4 Dudley-street, Melbourne
			Found ..	..	6·63	..	6·63	..	5·42	5·22	10·64	..	
2059	Braybrook	W. and M. Blood and Bone	Guaranteed	..	5·00	..	5·00	..	4·50	7·50	12·00	..	Western and Murray Co-operative Bacon and Meat Packing Co. Ltd., 522 Flinders-lane, Melbourne
			Found ..	..	5·57	..	5·57	..	7·37	5·70	13·07	..	
2060	„ ..	Pridham's Blood and Bone	Guaranteed	..	5·10	..	5·10	..	6·00	8·00	14·00	..	W. Pridham Pty. Ltd., Evans-street, Braybrook
			Found ..	..	5·38	..	5·38	..	7·73	4·81	12·54	..	

* Prosecution sample.

W. R. JEWELL,
Chemist for Agriculture.

23rd June, 1942.

DAIRYING WITHOUT MUD

The Efficacy of the Concrete Track

By L. A. MAHONY and E. CROWLEY, Dairy Supervisors

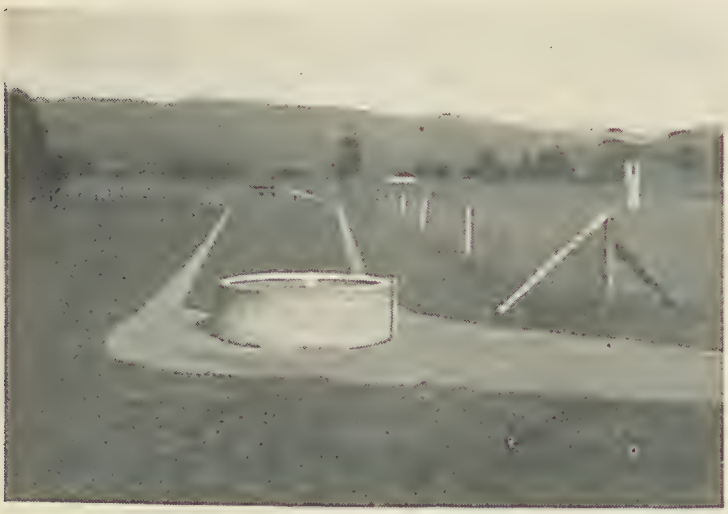
MUD is one of the most disheartening problems with which most dairy farmers have to contend. On many farms during the winter months cows may be seen dragging their legs and udders through mud more than a foot deep. Such conditions, in addition to giving much extra work, are also unhygienic, and are certainly responsible for a reduction in the quality of the milk and cream produced.

A great deal is heard from time to time of the drift of dairy workers to other occupations described as more congenial, and possibly the dirty, muddy working conditions to be found on many farms are partly responsible for this drift.

Much time is wasted in washing dirty udders, cleaning premises and equipment, treating sore and cracked teats, footrot and udder chills, all of which are due to slushy, muddy conditions about the dairy.

Some dairymen have tackled the problem by laying down slabs or squares of concrete at inlets and exits, but have found that where the cows stepped off the concrete, the mud was as deep as ever. Even fairly large areas of concrete laid in this fashion have failed to improve the position, and this has led many farmers to say, in effect, "No matter how far you take the concrete, there will be mud where the cows step off."

Cows on concrete tracks on the southern approaches to Messrs. Best and Carter's dairying premises.



Parallel tracks leading to cowyard, which is situated a few yards to right of picture. (See diagram on next page.)

Most farmers believe this to be true, but the experience of Messrs. Best and Carter, of Yarragon, does not support their belief. These farmers are dairying on heavy grey-soil flats, with an annual rainfall of 40 inches. Four years ago, 2½ acres of mud surrounded their dairying premises, and another area was so soiled by mud that it was useless as pasture. At an unimproved value of £60 per acre, this muddy area represented £150 worth of land lying idle, and a loss of £30 per year in carrying capacity. At the present time, despite the fact that 65 cows have been milked throughout the past winter, there is no mud to speak of at any period of the year.

This transformation has been achieved by laying down many chains of concrete tracks radiating from the dairying premises. Near the yard where traffic is heavy, parallel tracks about 10 feet apart have been laid, while drinking troughs are encircled with concrete.

In all, 800 yards of tracks have been laid down, and have proved such a sound investment that they are still being extended.

The benefits to be derived from a system of concrete tracks are so great that it would seem, even if it were necessary to borrow money to carry out the project, that it would be a sound business proposition to do so. Extra pasturage would be obtained, time would be saved, there would be lower herd wastage, and, what is an important consideration, working conditions would be improved.

It is not suggested that the ideal conditions aimed at by Messrs. Best and Carter are within the financial reach of the average farmer, but this should not discourage him from carrying out improvements on a modified scale.

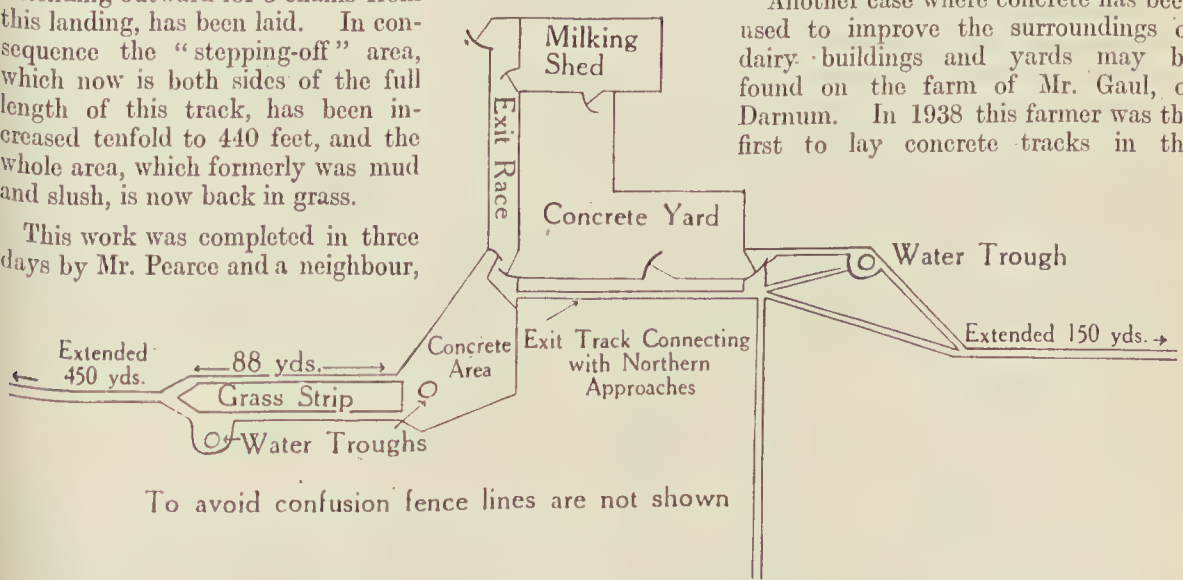
The north-eastern approaches to Messrs. Best and Carter's premises.

Another instance where the laying down of concrete tracks has been beneficial may be seen on the farm of Mr. Pearce, on the Gainsborough Flats, near Warragul. Two years ago, when this farmer took over a herd of 85, the cows were dragging themselves udder-deep through an acre and a half of grey, sticky mud at the exit of the walk-through bails. At that time there was an area of 224 square feet laid in one rectangular slab, that gave the cows a "stepping-off" area of only 44 feet. To-day, a 22-in. wide concrete track extending outward for 3 chains from this landing, has been laid. In consequence the "stepping-off" area, which now is both sides of the full length of this track, has been increased tenfold to 440 feet, and the whole area, which formerly was mud and slush, is now back in grass.

This work was completed in three days by Mr. Pearce and a neighbour, at a cost—excluding labour—of £8 2s. 6d. A sound earth track 22 inches wide was prepared and covered to a depth of 2 inches with second-grade sand to take seasonal expansion and contraction. Three inches of concrete, between timbered sides, was laid in sections on top of the sand. The proportions were five parts of good gravelly sand to one of cement.

In some sections of the track it was laid in one continuous strip, and divisions were made subsequently at suitable distances with a spade while the concrete was still wet.

Another case where concrete has been used to improve the surroundings of dairy buildings and yards may be found on the farm of Mr. Gaul, of Darnum. In 1938 this farmer was the first to lay concrete tracks in the



Layout of concrete tracks at Messrs. Best and Carter's dairying premises, Yarragon, Central Gippsland.

Warragul district. His herd, by having to plough through deep, heavy mud, day after day, had reached a state of exhaustion, and Mr. Gaul and his sons determined to lay a quarter of a mile of concrete tracks to four paddocks to remedy the trouble.

Assessing their labour at 1s. 6d. per man, per hour, and with material then slightly cheaper than it is to-day, they completed the work for £50 and solved the deep mud problem, in spite of drainage troubles in the area.

The mixture used was 4 parts metal, 3 parts sand, and 1 part cement, laid from 3 to 4 inches thick, according to the nature of the ground.

The width of the tracks is about 22 inches, although angles and approaches to gateways are winged to provide greater width, and the edges are rounded.

It should be emphasized that, apart from the economy of material, the reason for the narrow track is to prevent the "boss" cow from turning round to drive another cow off the track.

In two of the cases referred to, the tracks lead to the cowyard entrance. The route of the cows after milking then, is along the exit track from the bails, back to the tracks, and so to the paddock. This plan should be followed in all cases where possible, as it gives double use of tracks, and consequently double value for the money spent. It is desirable that twin tracks should be laid through gateways. Although 22 inches is given as the width of paths in the above cases, many farmers have found that tracks as narrow as 17 inches have proved quite satisfactory.

In some cases, where a track has been laid in one continuous strip and not in sections, old fencing wire—either barbed, plain, or netting—has been used for reinforcement. Two or three strands are placed along the prepared bed and the concrete is deposited on it.

When the installation of these tracks is being planned, very careful thought as to the layout should be given, so that they can be added to from time to time without scrapping any of the original.

Finally, it should be borne in mind that, in installing tracks, a dairy farmer is not making a costly experiment. If properly laid out, they will prove to be an asset which will give wonderful service, as they are at present giving on many farms to-day, under practical working conditions.

Book Review

The Poison Plants of New South Wales is a recent publication compiled by Evelyn Hurst, B.Sc. (Agr.), under direction of the Poison Plants Committee of New South Wales.

Mrs. Hurst was appointed to undertake the compilation from all previous work on poison plants. She had access to departmental files at the National Herbarium at the Glenfield Research Station; the Division of Animal Husbandry of the Department of Agriculture; and the Department of Pharmacy, Sydney University.

This collection and arrangement of existing knowledge was regarded as a necessary precedent to an endeavour to crystallize knowledge on poison plants, but no critical comments were made on the information listed.

It is anticipated by the Committee that the book will be most generally used by research workers and veterinary officers.

The volume was set up and printed by the Snelling Printing Works Pty. Ltd., Sydney, New South Wales.

Buy a £10 National Savings Bond

Blackleg in Cattle

By G. NICOL, B.V.Sc., Veterinary Officer

BLACKLEG of cattle is an acute infectious disease caused by a specific organism, *Clostridium chauvoei*. Animals in the best condition are the principal subjects; those between six and eighteen months of age are most susceptible, although cases among adult stock are on record.

Cause

The causal organism is an anaerobic bacillus, that is, a bacillus able to live and multiply under conditions where oxygen is absent or at a very low tension. In addition, it has the ability to form spores which often remain viable for years, despite extremes of temperature and exposure to physical and chemical agents. It is due to contamination of soil with these spores that outbreaks may occur from year to year mortalities often occurring in certain paddocks only, or in certain districts, such distribution being associated with soil or pasture contamination.

Infection

The organisms of blackleg gain access to the body either by ingestion of contaminated feed or through wounds in the skin. The important point to bear in mind, however, is that areas where blackleg-infected cattle have been buried are a potential source of infection.

Symptoms

The incubation period varies from two to five days. The course of the disease is rapid, lasting usually only about 12 to 48 hours. Symptoms such as a temperature rise, rapid breathing, cessation of rumination, loss of appetite, lameness in one or more legs, local swelling about the shoulder, thigh, and neck may occur, but owing to the rapid course of the disease these are seldom observed. In most cases the animals are reported dead without the owner having noticed any symptoms.

Post-mortem Examination

In typical cases examined after death a characteristic swelling about the shoulder, thigh, neck or loin may be found. Incision of the swelling shows a hard, dry skin, while the underlying muscular tissue appears dry and porous with blood-stained fluid very much in evidence, in addition to marked gas formation, such gas being the product of the organisms responsible for the disease. The affected muscle tissue is usually much darker in colour than normal.

In cases not typical it may be necessary to carefully skin the carcass before any lesions are encountered. In some cases the diaphragm, the base of the tongue, or even the heart muscle is the only muscular tissue involved, so that a cursory examination may fail to disclose the cause of death.

Diagnosis

Sudden deaths of young cattle, associated with lameness and characteristic parchment-like swellings which crackle on application of external pressure, should cause farmers to suspect blackleg. Laboratory diagnosis is based on the nature of the muscle lesions and the detection of the causal organisms.

Specimens forwarded for laboratory examination should be taken from the affected muscles and should be about 2 inches in diameter, the specimen being forwarded in a screw-top glass jar, addressed to the Director, Veterinary Research Institute, Parkville, N.2. The Director should be immediately notified of the despatch of the specimen.

Prevention

Attempts at treatment of blackleg cases are a waste of time. The practice of making incisions into the muscle swellings will not cure affected animals, but instead, is likely to distribute the organisms about the property. Prevention of further cases in subsequent years may be assisted by proper disposal of carcasses by burning, and by avoiding transfer of stock to paddocks where an outbreak has been known to occur, unless such stock have been previously vaccinated and withheld until a reasonable degree of immunity is likely to have developed. In addition the burning off of infected pastures is a useful precautionary measure. *The only really effective method of prevention, however, is by vaccination of calves before they reach the susceptible age.*

Stock-owners often waver in making a decision to vaccinate their stock, but it should be borne in mind that if blackleg has occurred on a property in the past, this is a sufficient reason to go ahead with vaccination of calves against the disease. A previous history indicates that spores of the organism responsible for the disease may still be present in the soil.

Calves of any age may be vaccinated. Sufficient immunity to withstand contact with infection is not developed until at least fourteen days following vaccination, hence the necessity to withhold vaccinated stock from possibly infected paddocks for at least fourteen days. Vaccination of unaffected stock at the time of an outbreak may or may not be successful in combating the trouble; success would depend on whether or not the apparently unaffected animals are in the incubation stages of the disease. It is questionable whether vaccination of stock two years of age and over is of very much value, as by this time they have usually lost their susceptibility.

Blackleg vaccine is obtainable from the Commonwealth Serum Laboratories, Parkville, N.2, on presentation of a permit issued by a Government veterinary officer or stock inspector. The dose of 5 ml. is injected subcutaneously, usually behind the shoulder. For this purpose a 10 ml. or 20 ml. syringe is convenient, this being sterilized by boiling before use. Glass barrel syringes should have the plunger and barrel separated before boiling to avoid cracking the glass barrel. The site chosen for the injection is clipped free of hair and painted with weak tincture of iodine. Gauge 18 is a convenient size of hypodermic needle (stainless steel type), and is readily obtainable. These should be boiled with the syringe.

Injection is made by piercing the prepared area of skin, care being taken to avoid the penetration of the underlying muscular tissue. This is most readily performed by taking up a small fold of skin and making the injection through one thickness, avoiding contamination by the fingers of the prepared area.

As blackleg is included in the list of notifiable diseases under the Stock Diseases Act, any outbreak must be reported to the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Economize with Superphosphate

Because of the present shortage of superphosphate, it is essential that available supplies be used efficiently and that there should be no wastage of soil fertility that would involve a heavier use of phosphatic manure than is absolutely necessary.

The response to applications of "super." becomes progressively less as the rate of dressing is increased, or, in other words, the improvement from the first ½ cwt. is usually greater than from the second, and the second greater than the third, until a point is reached where the rate of application can be increased without further benefit.

At the moment, farmers are not able to apply the optimum amount of "super.", but the quantity they are able to obtain can be used most efficiently if spread over the whole of the area previously treated rather than used at the usual rate on a limited area.

Extension of pasture improvement at present must be undertaken with due regard to the shortage of phosphatic fertilizer.

If it has been observed that the response to superphosphate over the last few years has been steadily declining, it is desirable to investigate this rather than continue to apply "super." and hope for the best. Usually the trouble is a deficiency of potash induced by removing excessive amounts of plant mineral food from the soil and not returning them.

In cases where potash deficiency is acute, it becomes uneconomic to use "super." until the deficiency of potassium is overcome.

One common cause of wastage of fertility is to mow repeatedly the same area and feed the produce elsewhere, while another, equally as bad and perhaps more general, is to waste farmyard manure, for this contains much of the mineral matter removed from the soil by the pastures and crops.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cows

IN Victoria, the tendency now is to have cows calve earlier in the season. Frequently herds are mated to calve in March in early districts, and in July in late districts.

It is found that the milk yield per cow per day varies with the amount and nature of the pasturage, and that, while cows calving late in the spring may produce higher maximum daily yields, they drop much more quickly and do not milk so persistently or produce as much milk in 273 days as those cows which calve earlier.

At the State Research Farm, Werribee, a survey of the records of 586 Red Polls and 143 Friesians reveals that cows calving between April and September produce larger quantities of milk and butterfat than do cows calving between October and March. In fact, Red Poll cows calving between April and September have produced 50 gallons more milk, and Friesian cows 150 gallons more milk, than cows calving during the hotter months from October to March.

As Werribee is an irrigation district where good succulent pasturage is usually abundant from October to May inclusive, it may seem strange that the cows calving before the flush pasture season do best. This is explained by the fact that yields can be maintained more satisfactorily by hand feed during the earlier stages of the lactation period than in the later stages, whereas green pasture does maintain higher yields during the later stages of the lactation. High temperatures also have an adverse effect on high yields.

Farmers are advised to have most of their cows calve several weeks before the flush season begins—somewhere between April and August, depending upon the district. Therefore, all cows and heifers should be mated before the end of October.

To some extent the success of this procedure depends upon the way the cows are fed early in their lactations, and this requires good reserves of home-grown fodders. Final preparations for the harvesting of all surplus grass for silage and hay should now be made.

Beef Cattle

This year the new season's lambs are not expected to reduce the demands for beef as much as usual because the requirements of the defence forces and canners will remain high. This demand will maintain prices and may induce farmers, who have to finance increased costs of production, to forward much beef-bred

stock to market in lighter condition, instead of holding it to grow and fatten during the spring and summer for sale next autumn and winter.

The demand and high prices for canning beef will also draw many thousands of cows from dairy farms, unless the dairy farmers can obtain labour to relieve the strain and difficulties under which they have been working during the past nine months.

To judge by the large numbers of cows being marketed for slaughter each week, a tremendous shortage of cattle will be evident in the near future, and this will reflect very seriously on the beef (and dairy) position. It is advisable, therefore, to keep and mate to beef-bred bulls every possible cow or heifer, which shows some beef or dual-purpose characteristics and which is not required for dairying. Such cows will calve next August and the calves can be reared on the dams for sale as vealers the following winter or, if it is then possible to milk the cows, the calves may be hand-reared to make good breeding cows and bullocks.

Unless the slaughtering of cows is checked, property owners will suddenely find that they are understocked and will be faced with expensive re-stocking. Last summer and autumn, sheep were very cheap to buy for replacing cattle, but, this year, a bounteous season in the sheep areas, together with the increased prices of both wool and fat lambs, will be reflected in higher prices for all store and other sheep.

Lack of experience with sheep, and the troubles associated with sheep in dairying and cattle country, are serious problems for farmers who may re-stock with sheep. For these two important reasons dairy farmers will eventually find beef production more profitable than sheep as a sideline to meet present labour problems.

The extent to which dairy farmers can obtain finance for beef production is an important and individual matter. Dairy farmers normally receive immediate returns each month. On the other hand, in beef production, a larger amount of capital is "tied up" and the returns come in at the end of one, two, three, or even four years, depending upon whether vealers or bullocks are produced. The average dairy farmer has not the capital to wait such a long time for his returns.

From the financial aspect, wool and fat lamb raising have advantages over beef production because the revenue comes in at least twice within each year, part when the wool is sold and part when the lambs are sold.

It is a very short-sighted procedure to sell off cows. This policy may increase the quantity of beef available during the current season, but it will be reflected in drastic reductions next year. Farmers are advised, therefore, to keep every useful cow for breeding purposes and maintain beef supplies by breeding more stock, by growing it larger, and by marketing it in primer condition. In so doing they will not only assist themselves, but will aid the war effort by complying with the Commonwealth Government's request for increased beef production.

Sheep

In order to minimize the risk of loss or avoidable delay in the transit of wool, the Victorian Railways authorities have issued instructions that, where any consignment of wool is less than one truck lot, each bale or package must be branded to indicate the name of the broker to whom the wool is consigned. This brand is additional to the owners' usual brand and bale number, *and must be placed at the bottom left hand corner of the branded side of the bale.* The code which owners must adopt when branding their bales can be ascertained from brokers and the Victorian Railways Department.

Advantages of Bulk Classing.

While considerable progress in grading and classing has been made by the wool-growing industry, there is yet scope for substantial improvement. Grading and classing have been carried out in this industry ever since its inception, especially on the big holdings where qualified classers are retained during the shearing season. In most cases, however, the small grower has been content, through ignorance of the art of wool-classing, or financial inability to employ a classer to grade his small clip, to send his wool to the broker in a condition to their mutual disadvantage.

In addition to the disadvantage wool suffers through lack of proper classing, there is the further disability that no amount of wool-classing efficiency can overcome the disadvantages peculiar to small clips. Wool marketed in small quantities, no matter how well-graded it may be, does not command the prices obtained for wool in larger, more evenly-balanced lots. It is here that classing and grading reform in the wool industry is necessary, and this reform may be made only by classing in the bulk.

The main object of the bulk classing system is to mass and place on the market in the best marketable state, true, even lines of wool, which belong to various small owners, instead of numbers of small parcels such as bags, fadges, and light-weight bales. This also facilitates the actual marketing, since brokers can handle bulk-classed wools with more ease and economy than the same wools in irregular packages, bags, and light-weight bales. Further, four-bale lines and over, provided the wool is even and true, sell more readily, and with more profit to the grower than two- or three-bale lines.

Under the bulk-classing system, the contents of the original package are graded and put into separate bins; each sort is weighed and balanced with the total weight received. As an example, a bale weighing 350 lb. net may be divided into, say, 220 lb. of fleeces, 100 lb. of pieces, and 30 lb. of locks. Each owner is credited with and paid the exact value of each different class of wool forwarded, even though there be several owners represented in the one bin. When a sufficient number of bales of the same quality are packed, the wool is then offered in lines as big as possible.

It is estimated that 25 per cent. of the Australian wool clip could be so treated under the bulk-classing system, and from the national as well as the individual point of view, the adoption of this system would be of inestimable value.

[N. A. Bowman, Sheep and Wool Expert.]

Backfatter sow sold at Melbourne Market on 17th September, 1942, for £20 1s.—the highest price paid at this market for over 20 years. The carcass weighed 556 lb.

Replace Old Sows

Now is a good time to replace old or poor-producing brood sows. They can be fattened quickly on grain and pasture, and, if recent values continue, prices should be very attractive. Replacements can be made with heavy baconer gilts, about 250 lb. liveweight and ready to mate, which have a market value at present about half that of the backfatters which they replace.

In the selection of gilts to add to the breeding herd, it is best to use home-bred pigs or, when practicable, to visit the farm where they are bred, so that their sire, dam, and litter mates also can be appraised. There is always a risk incurred in the buying of a breeding pig, but this risk is reduced if the pig's relatives are known.

Whether grade or registered pure bred gilts are being selected, information about the prolificacy and production of their relatives should be obtained when possible as a guide to the breeding capacity of the family.

Gilts to be used for breeding should be well grown for their age, not less than 1 lb. liveweight for every day of their age, and of desirable conformation—that is, in most cases, long-bodied baconer type. They should have twelve or more well-placed teats, and should be apparently sound and thrifty.

[L. A. Downey, H.D.A., Pig Expert.]

Grooming Horses

The horse should be cool and dry before grooming. Commencing on the near side of the neck behind the ear, the coat must be thoroughly brushed, the brush being moved the way the hair lies. To remove hard dirt and scurf a circular motion may be more effective. When the near side is completed, the off side, starting near the neck, should be gone over.

The legs should then be groomed. The horse is next turned round in the stall, and the head and mane are thoroughly brushed. The eyes, nostrils, and dock should then be cleaned. The animal is then turned round once again, and the tail is well brushed out. Finally, a thorough polish is given with a rubber in place of the brush.

The feet should be lifted and cleaned out daily. Unfortunately, this is a matter frequently neglected. Every few days the sheath should be washed out and dried, precaution being taken not to use soft soap for this purpose.

The use of the curry-comb is not recommended for the horse's coat. Its use should be

confined to the cleansing of the brush. Horses at work should be groomed thoroughly every morning before exercise, and again, to a lesser extent, after exercise. A well-groomed horse will never harbour skin parasites, such as mange and lice. Such parasites will not survive the constant disturbance brought about by the use of a brush.

Washing a horse should not be practised except to remove mud, &c., after work. In such cases, however, the animal must be dried immediately, as otherwise skin troubles such as greasy heels, cracked heels, or mud fever may soon appear. Water actually has little effect in cleansing a horse's skin, but definitely checks the action of the oil glands, and will thus render the coat dry and harsh by stopping the proper oil secretion.

The effect of regular daily grooming is easily recognized by the bright, clean, and healthy appearance of the animal, which thoroughly repays the labour expended.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Poultry

Breeders are paying more attention to the size of eggs than has been done in the past, when numbers of eggs, regardless of size, were considered to be of paramount importance, and when high prices were paid for birds laying about 300 eggs in twelve months for breeding purposes. There could be no greater folly than to make numbers the basis of selection, and unless birds have a potential breeding value for producing eggs of good size and quality, they are worth very little, and it will be harmful to breed from them.

The average housewife dislikes buying small eggs unless they are exceedingly cheap. Small eggs generally cause dissatisfaction, and tend to lower the average price of all eggs sold, resulting in a loss to the poultry farmer.

Size of egg is inherited, but it must be remembered that, although certain strains of poultry may have inherited the factor for laying large eggs, the eggs may decrease in size through faulty feeding and management. It should be the aim of all those engaged in the industry to breed from birds that lay eggs of good size and quality, as food and marketing costs are no greater than are required for producing and selling small-sized eggs.

If the small egg is not eliminated, there is also the risk that it may be used for incubation, resulting in delicate chickens and deterioration in the health and size of the flock. Although some large birds lay small eggs and some small birds lay large eggs, it is a fact that loss of size within a breed is usually followed by laying small eggs and by degeneracy.

[H. F. Clinton, Poultry Expert.]

Bees

Swarm control will be the most important task in the apiary during the present month. The heavy blooming of capeweed has provided ideal breeding conditions, and the colonies generally are strong, with the exception of some apiaries left within reach of winter-flowering grey box and yellow gum, where there was a certain degree of spring dwindle.

Colonies previously selected for queen and drone rearing should now be in forward condition. In the northern area, queen rearing can now be carried out, but in the cooler southern districts a start should not be made until the end of this month, as fine sunny weather is necessary for the successful mating of a high percentage of young queens. Nuclei prepared for the mating of young queens should not be situated near the main apiary, but placed in a quiet sheltered spot some distance away. This will tend to reduce the loss caused by swarming, when the young queen leaves the nucleus in her mating flight.

Coastal ti-tree on the Mornington peninsula is in full bloom and yielding well. The honey from this source is very dense, and should be extracted before the combs are fully capped, otherwise broken and partly extracted combs will result. Where possible, extraction of this honey should be timed to finish not later than the 20th of the month, since the flow of this nectar usually ceases with the first heavy showers after that date. After the cessation of this flow, extracting becomes almost impossible owing to the intense robbing of combs immediately on removal from the hives by bees.

[J. W. Thomlinson, Apiary Inspector.]

Save, and Lend your Savings to the Nation!

Burnley Egg-Laying Competition

Results of Winter Test

By H. F. CLINTON, Poultry Expert

THE thirty-second Egg-Laying Competition for fowls, conducted at the School of Primary Agriculture and Horticulture, Burnley, commenced on 1st April, 1942, and will continue until 2nd March, 1943, a period of 48 weeks.

Owing to the manpower situation, the Department was forced, this year, to limit the Competition to Section "B"—Individual Birds—Single Test, eliminating Section "A"—Groups of 6 birds—Trapnested.

The winter test, conducted in connexion with this competition, included the first four months (122 days), and concluded on the 31st July. The test is held annually for the purpose of giving prominence to the birds that lay well during this period, when prices of eggs are high. In this test, certificates were awarded for the greatest number of first-grade eggs laid by individual birds in all classes of Section B, provided that a bird laid 60 first-grade eggs. During the first two months, a first-grade egg must weigh not less than $1\frac{3}{4}$ oz., and thereafter not less than 2 oz.

As was the case last year, it is very pleasing to note that the eggs laid by the prize winning birds were practically all first-grade. Some very high scores were recorded. In the class for Australorps four birds each laid over 100 first-grade eggs, and 12 other birds in this class laid over 90 first-grade eggs each, in the 122 days of the test. The highest number of first-grade eggs laid by a bird in all classes of the competition was recorded by an Australorp, owned by Mr. T. J. Crewther. This bird laid 109 first-grade eggs.

The relative merits of the wet and dry mash systems of feeding have always been a subject for discussion, therefore, Table 1, showing the number of eggs laid by each of the winning birds in the classes for White Leghorns, compared with those of the two previous years, will be of interest. The figures would indicate that much depends on the laying capacity of the birds themselves.

Rhode Island Reds are again well represented in the present competition with a total of 34 birds entered in the Individual Bird Test. Some very good scores were recorded for this excellent table breed.

TABLE 1.

	1940.			1941.			1942.		
	Total Eggs.	Under Weight.	First Grade Eggs.	Total Eggs.	Under Weight.	First Grade Eggs.	Total Eggs.	Under Weight.	First Grade Eggs.
Wet mash	94	1	93	103	..	103	93	..	93
Dry mash	88	..	88	111	..	111	108	1	107

Section B.—
Individual Birds—Single Test

In the class for White Leghorns fed on wet mash, Mr. A. Johnson won first prize with a bird that laid 93 eggs, all first grade. Mr. R. N. Teasdale gained second prize with a bird that laid 89 eggs, and Messrs. A. T. Dent, and A. Martin were equal third, each of their birds having laid 88 eggs.

In the White Leghorn class, fed on dry mash, Mr. A. Martin secured first prize with a bird that laid 107 first-grade eggs. Mr. F. Smith (Lenham Poultry Farm) gained second prize with a bird that laid 93 eggs, and Messrs. S. J. Lethlean, and B. Sweeney (Tarara Poultry Farm) were equal third with birds that laid 92 eggs each.

First prize in class 3, i.e., all light breeds other than White Leghorns, was awarded to Mr J. Granter, whose Brown Leghorn laid 73 first-grade eggs.

In the class for Australorps, Mr. T. J. Crewther won first and third prizes with birds that laid 109 and 107 first-grade eggs respectively. Messrs. Sweeney Bros. gained second prize with a bird that laid 108 eggs.

Mr. R. Farrin-Webb obtained first prize in the class for Rhode Island Reds, with a bird that laid 86 eggs, all first-grade. Equal second prizes were awarded to Messrs. L. B. Bryan, and J. Chatts, each of their birds having laid 84 eggs.

PRIZE LIST

SECTION B.—INDIVIDUAL BIRDS—SINGLE TEST.

Pen No.	Name and Address.	Total Eggs	Under-weight.	First Grade Eggs.
	Class 1.—White Leghorns—Wet Mash.			
	FIRST PRIZE, CHAMPION CERTIFICATE.			
30	A. Johnson, Sunray-avenue, Cheltenham, S.22	93	..	93
	SECOND PRIZE—GOVERNMENT CERTIFICATE.			
68	R. N. Teasdale, Box 26, Rupanyup	89	..	89
	EQUAL THIRD PRIZE—GOVERNMENT CERTIFICATE.			
17	A. T. Dent, "Ridgeway," Sellars-street, Greensborough	89	1	88
53	A. Martin, 23 Clonaig-street, Brighton East, S.6	88	..	88
	Class 2.—White Leghorns—Dry Mash.			
	FIRST PRIZE—CHAMPION CERTIFICATE.			
218	A. Martin, 23 Clonaig-street, Brighton East, S.6	108	1	107
	SECOND PRIZE—GOVERNMENT CERTIFICATE.			
211	Lenham Poultry Farm (F. Smith), Terang	95	2	93
	EQUAL THIRD PRIZE—GOVERNMENT CERTIFICATE.			
213	S. J. Lethlean, Jell's-road, Mulgrave	94	2	92
227	Tarara Poultry Farm (B. Sweeney), 55 Rundle-street, Ararat	92	..	92

Section B.—Individual Birds—Single Test.—*continued.*

Pen No.	Name and Address.	Total Eggs.	Under-weight.	First Grade Eggs.
	Class 3.—All Light Breeds, other than White Leghorns—Wet Mash.			
	FIRST PRIZE—CHAMPION CERTIFICATE.			
87	J. Granter, 163 Martin-street, Gardenvale, S.4. (Brown Leghorn)	75	2	73
	Class 4.—Australorps—Wet Mash.			
	FIRST PRIZE—CHAMPION CERTIFICATE.			
97	T. J. Crewther, Carlow-street, East Bentleigh, S.E.15	110	1	109
	SECOND PRIZE—GOVERNMENT CERTIFICATE.			
130	Sweeney Bros., Ararat ..	108	..	108
	THIRD PRIZE—GOVERNMENT CERTIFICATE.			
98	T. J. Crewther, Carlow-street, East Bentleigh, S.E.15	107	..	107
	Class 5.—Rhode Island Reds—Wet Mash.			
	FIRST PRIZE—CHAMPION CERTIFICATE.			
165	R. Farrin-Webb, "Rafa," Traralgon	86	..	86
	EQUAL SECOND PRIZE—GOVERNMENT CERTIFICATE.			
161	L. B. Bryan, 58 Yarralea-street, Alphington, N.20	84	..	84
194	J. Chatts, White-street, Beaumaris	84	..	84

In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

THE present prospects for apple and pear crops throughout the State are excellent and, provided growers can obtain sufficient labour to look after their trees during the growing period, a satisfactory season may be expected.

Most growers realize that clean apples and pears are cheaper to handle than fruit which is largely infested with codling moth. The foundation for successful control of this pest should be laid by applying a thorough spray of lead arsenate, strength 3 lb. of powder in 100 gallons of water at the calyx stage.

Using a spray rod for the calyx spray on pear trees.

For apples, the spray should be put on when the majority of the petals have fallen, but for pears, unless moth activity indicates that earlier sprays are required, the spray should be delayed until the young fruits are commencing to bend over, because the calyx does not begin to close up until this stage. This spray is particularly important for pears because the calyx is most open to attack by grubs and it is only at this time of the year that a really successful spraying job may be done to protect it. Spray rods should be used in preference to guns because they enable the operators to direct the spray downward on to the calyx cups.

Growers who use lures for timing codling moth sprays should place them in the trees by the middle of October. A set of ten lures placed in every third tree of a row should be sufficient. The best material to use for luring moths is a sweet wine of the port type diluted one part in ten of water. Other suitable

materials include vinegar, apple juice, or molasses. In order that the lures should prove most useful, it is necessary to refill the jars each week with fresh solution and keep regular records of moth catches by inspecting the lures twice a week. It is the intention of the Department to maintain sets of lures in each district this year, and the usual advisory services will be in operation.

The green peach aphid and cherry aphid may appear on new growth this month, particularly on the tips of leaders which missed the tar distillate spray. A spray of nicotine sulphate, 1 pint in 80 gallons, together with 2 lb. of soft soap, should be applied as soon as these insects appear. To delay this spray means that the insects will quickly increase in numbers, causing leaves to curl and so preventing efficient penetration by the spray.

For the control of brown rot on cherries, sprays of lime sulphur, 1 gallon in 80, when the fruit is quarter or half-grown, should be used. A spray of ammonium polysulphide, 1 in 80, together with 3 lb. of soft soap, should also be applied just before harvesting the fruit.

For peaches, a spray of dry-mix lime sulphur, 25 lb. in 100 gallons, for the control of brown rot and rust may be applied when the "stockings" fall off the fruit. If green or black aphids are present, nicotine sulphate may be combined with this spray.

Growers who intend to thin out heavy crops of apples and pears should do so within 30 days of the fruit setting. The tendency of trees to bear crops in alternate years may be reduced by completing the thinning within this period and allowing only one fruit in every three or four blossom clusters to remain.

Some growers intend to spray some of their apples at blossom to prevent the fruit from setting. This also will promote the development of a heavy crop next year. The chief reason for spraying the blossom, however, is to reduce the area of orchard to a size which can be worked efficiently with the labour available. Pamphlets dealing with the use of blossom removal sprays are available free on application to the Department of Agriculture, Melbourne, C.2.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley

PREPARATION must be made now for planting out summer-flowering annuals. If the soil is well prepared by digging in a good application of well-decomposed stable manure with a light sprinkling of blood and bone, and the plants are put out early, a long and bright flowering period will be the result. Heavy manuring is necessary for the beds of summer-flowering annuals, because the plants are placed at fairly short distances apart and root systems are interlocking. Another reason why manuring must be liberal is that flower gardens in the majority of suburban allotments are seldom "spelled"; the keen gardener is anxious to have a bright display of flowers throughout the year. Under such conditions, loss of soil fertility is rapid, but not often apparent during the first few years after the garden is made. It should be remembered that it is better to maintain fertility by adding manures, even from the beginning, for it sometimes takes several years to restore a "worked-out" soil.

Marigolds

Marigolds have been deservedly popular because of their bright colours, free-flowering habits, long-flowering period, and hardiness. They grow best in a good loam, but are very tolerant of soil conditions, and quite good displays can be produced on almost any kind of soil.

One of the best types of marigold for summer and autumn flowering is the double **Fistulosa**, often called the African Marigold, although it is a native of Mexico. This type is useful for garden display and for cutting, and both lemon and orange shades are available.

Guinea Gold is a well-known variety of carnation-flowered marigold, with beautiful, golden-yellow, double flowers with fringed petals. It is free-flowering and grows to a height of about 3 feet. It is rather a difficult variety to keep true, and a small percentage of single flowers will appear even in carefully selected strains.

Marigolds have a rather objectionable odour, and some people refrain from bringing them into the house on this account. Recently, there have been developed varieties which have little or no odour, e.g., **Gigantea Sunset Giants** and **Burpee Gold.** The former of these produces very large blooms, ranging in colour from deep orange to lemon, and the plants grow from 3 to 4 inches in height.

Burpee Gold also has large blooms, with rather loose petals of a deep golden-orange colour. Heavy rains and heavy over-head watering often makes these large blooms so heavy that the stems bend and the flowers droop. With these varieties, it is advisable to direct the water at the base of the plants and avoid over-head sprinkling as much as possible during the flowering period. In windy situations it is also necessary to stake these tall-growing varieties.

Chrysanthemum-flowered hybrids have made their appearance amongst the marigolds. These have well-formed flowers with incurved petals resembling the incurved chrysanthemum. The flowers are borne on long stems which make them very valuable for cutting, and the colours range from yellow to orange.

This month the long, narrow seed of the African marigold can be sown in seed beds and covered with about a quarter of an inch of soil. If the soil used in covering the seed is sandy and contains some old, sifted, horse manure, it will not tend to cake. Do not sow the seed too thickly, and aim at short, sturdy, dark-green plants for transplanting to their permanent beds. The plants should be spaced about 18 inches apart in the garden.

Zinnias

For really brilliant colour effects in the garden, few flowers can compete with the zinnia. The zinnia, like the marigold, is hardy and easily grown in Victorian gardens, provided it is planted in an open sunny position.

The small types, like **Zinnia linearis, Z. Haageana,** and the **Lilliput** or **Pompom zinnia,** are popular for edgings and for massed effects in the foreground of large beds, while the giant dahlia-flowered and giant double types are very useful in the background either massed or scattered amongst other plants which do not shade them too much.

Seed may be sown in the same manner as for marigolds and the plants are transplanted when about 3 inches high. Space the small types of zinnias about 10 inches apart, and for border effects, a double, "staggered" row is the best system of planting.

The larger zinnias require from 18 to 20 inches between the plants, and it is an advantage to stake the plants. The first main growth which terminates in a flower is often cut back to induce lateral branching and a more compact and shrubby plant.

THE VEGETABLE GARDEN

Successive plantings of crops sown last month should be made during October. French beans, peas, particularly "Greenfeast" variety, summer (round-seeded) spinach, radish, and potatoes may be planted. In addition, the weather is now warm enough to sow or plant out lettuce, tomatoes, cucumber, gherkin, marrow, pumpkin, sweet corn, and preserving or citron melon.

Lettuce

Good varieties of lettuce for sowing this month are **Imperial 847** and **Iceberg. Imperial 847** is a black-seeded lettuce which forms very large hearts, while **Iceberg,** although a little smaller, has good, curly, crisp, light-green leaves with a brownish tinge along the margins. **Mignonette** is a small, brown, quick-maturing lettuce which can be sown from August to October. The leaves of this variety are very tender and the hearts are green. It is more suitable for the home garden than for the market garden because of this tenderness. It hearts readily and is always popular with the amateur gardener.

In August, lettuce seed is sown in seed beds. The seed is covered with about half an inch of sandy soil, and, later, when the plants are large enough to handle, they are transplanted to the garden beds, and spaced about 13 inches apart in rows about 14 inches to 16 inches apart. Many gardeners grow this quick-maturing crop between rows of slower-growing crops, such as carrot, parsnip, tomato, &c. If it is intended to do this inter-planting, the rows of the slower growing crops can be planted slightly wider apart than under ordinary conditions. In this way, the maximum amount of produce can be harvested from limited areas.

Another method of sowing lettuce seed, and one which is favoured as warmer weather comes, is to sow the seed thinly in drills either 12 inches apart or between rows of other vegetables. A very light sprinkling of sandy

soil should cover the seeds and then a light sifting of old manure or leaf mould should be given. If necessary, a light shading, such as can be provided by asparagus fronds, light prunings from tea-tree, &c., can be placed over the drill rows until the seed is germinated. Shading must not be too dense, otherwise frail, pale-greenish seedlings, which are easily sunburnt, damaged by wind, or attacked by disease, will be the result.

If seed is sown in drills, plants should be thinned to 10-12 inches apart. Do not delay this thinning process, because the severe competition of the closely-packed seedlings has a stunting effect on the plants which are allowed to remain for full development.

It is advisable when growing lettuce to ensure that the plants do not receive a check during their growth. Nitrogenous manures such as sulphate of ammonia and nitrate of soda in a solution, made at a strength of 1 oz. per gallon of water, may be applied at intervals of two or three weeks to stimulate growth. Stable manure and blood and bone manure, at the rate of 3 or 4 oz. per square yard, may be dug into the beds before planting. Frequent cultivation and watering must be practised if good lettuces with firm hearts are desired.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Date of Certification.	Number of Birds.
Reformatory Prison, Castlemaine	6.3.42	200
"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26.3.42	927
Stewart, J. A., Castlemaine	22.4.42	592
Rushton's Electric Hatcheries, (J. Rushton), Shepparton	28.4.42	653
Christie, R. R., and Son, Bentleigh	1.5.42	719
Becker, F. W., Cheltenham	1.5.42	315
Kostos, D., cr. Collins and Waverley roads	11.5.42	801
Evans, R., 50 Simpson-street, Kyneton	11.5.42	35
Throup, R. E., Neerim South	11.5.42	200
Berry, R., Campbell's Creek	11.5.42	87
Flack, Mrs. Florence, Horsham	11.5.42	100
Need, H. G., Warragul	15.5.42	254
Smith, R. Harcourt	15.5.42	97
Dookie Agricultural College, Dookie	19.5.42	447
Pettigrove, D. N., Kennington, via Bendigo	19.5.42	558
Wohlers, S., Jung	21.5.42	139
Throup, N. C., Neerim South	21.5.42	67
Mair, W. P., Tyabb	21.5.42	38
Horsfall, J. B., Lower Templestowe	26.5.42	720
Smith, F., Terang	1.6.42	947
San Miguel, Mrs. M. H., Box Hill	1.6.42	1,503
Rae, J., Sebastopol	1.6.42	1,497
Bartlett, O. E., Pimpinio	1.6.42	228
Cakebread, H., Shady Creek, via Buln Buln	3.6.42	112
Simpson, G. D., Tally Ho	3.6.42	680
Clark, H. N. Croydon	8.6.42	1,631
Abernethy, F. J., Horsham	8.6.42	368
Heath, A. L., Spring Vale	8.6.42	130
Lowe, L. S., Bayswater	8.6.42	241
Youl, R. S., Wedderburn	8.6.42	757
Hewett, A., Bayswater	8.6.42	247
Thomas, Mrs. J., Outtrim	8.6.42	100
Barnes, J. H., Blackburn	8.6.42	978
Wimhurst, C. J., Tongala	8.6.42	417
Williams, V. (Wangaratta Hatchery), 91 Tone-road, Wangaratta	12.6.42	568
Kosch, E. W., Minyip	12.6.42	343
Mumford, L. J., Healesville	12.6.42	252
Broadbent, C. A., Yarraberb, via Derby	12.6.42	193
Massie, G., Shepparton	12.6.42	1,309
Shipp, R., Kerang	12.6.42	375
Hopkins, C. A., Shepparton	12.6.42	1,348
Hunt, R. R., Burwood	19.6.42	300
Henderson, C. W., Shepparton East	22.6.42	247
Mitchell, B., Kangaroo Flat	22.6.42	793
Gwyther, R. P., Highton, via Geelong	22.6.42	206
Hayes, R., Montrose	22.6.42	188
Sloan, G. J., Bayswater	26.6.42	191
Everard, H. L., Hawkesdale	26.6.42	321
Ridgway, G., Noble Park	30.6.42	76
Stephenson, Mrs. K., Research	30.6.42	93
Jones, M. A., Ringwood	2.7.42	283
Major, W. R., Girgarre	2.7.42	88
Walters, Mrs. V., Lower Templestowe	2.7.42	44
Grenville Stud Poultry Farm, Springvale South	2.7.42	1,640
Coupar, J. E., Nathalia	2.7.42	487
Clegg, R. M., Hamilton	7.7.42	14
Mackintosh, Walter C., Neerim South	8.7.42	194
Hurst, H., Eltham	9.7.42	913
Jackson, C. and H., Carrum Downs	9.7.42	94
Webb, A. E. H., Cranbourne	13.7.42	1,541
Scouller, R. C., Cobden	13.7.42	100
Gibbs, A. E., Stanhope	15.7.42	623
Abikhair and Tacey, Heidelberg	15.7.42	538
All Red Poultry Farm (E. M. Nichols), Yan Yean	15.7.42	460
Peck, D., Tally Ho	15.7.42	275
Pearse, Mrs. H. F., Donald	22.7.42	232
Hockley, N., Hamilton	22.7.42	22
Everist, F. R., Tyabb	29.7.42	40
Lumsden, R. G., Ballarat	1.8.42	11
Greenwood, J., Forest Hill	1.8.42	346
Bassett, R. A., South Muckleford	4.8.42	114
State Research Farm, Werribee	11.8.42	380
Hines, W. and C. A., Traynor's Lagoon, via St. Arnaud	12.8.42	1,096
Bradstreet, J. F., Tally Ho	22.8.42	120
Maher, A. E., Wal Wale	26.8.42	666
McKinnon, Miss M., Yillima, via Nathalia	1.9.42	113
Thomas, C. H., 325 Highbury-road, Burwood	2.9.42	142

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69	Longerenong Agricultural College	Dooen	43
Banyule Stud Pty. Ltd.	Wangaratta ..	42	McNabb and Son, G. A.	Irrewillipe East ..	177
Black, I. S., Estate ..	Mount Noorat ..	52	Onley, W. H. ..	"Glenholme," Caldermeade	50
Clarke, A. B. ..	Glenormiston South	16			
Dennis, Mrs. A. A. ..	Frankston.. ..	33	Payne, A. E. T. ..	"Yarra View," Lilydale	63
Dookie Agricultural College	Dookie	77	Payne, T. E. N. ..	"Woodburn," Kilmore	46
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18	Powell, T. S. ..	"Carellen," Mansfield	46
Geelong Grammar School	Corio	56	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29	Samuel, Misses G. and E.	Lang Lang ..	48
Gorman, A. W. ..	"Cathcart," Alexandra	61	School of Horticulture	Burnley	9
Holloway, R. W. ..	Caldermeade ..	72	State Experiment Farm	Rutherglen ..	40
Kilmany Park Farm Home for Boys	Sale	94	State Research Farm	Werribee	229
Lawrence, P. H. ..	"Rainga," Tarrawarra	72	Wells, W. G. ..	Caldermeade ..	65

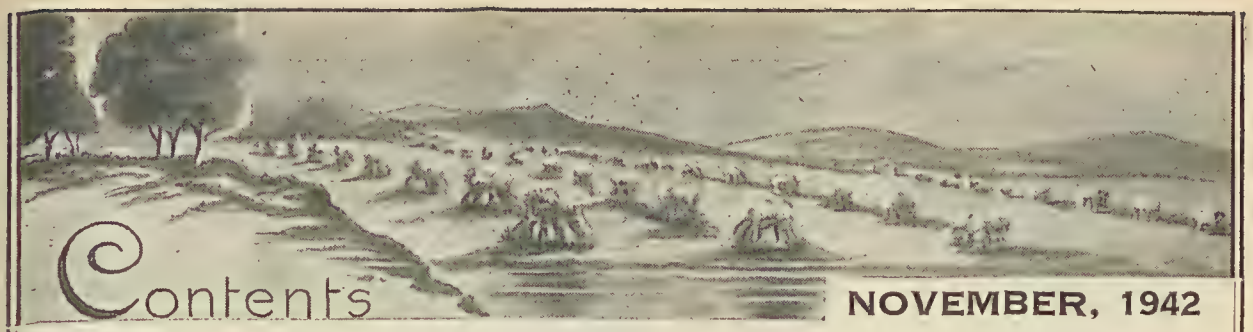
In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43	Child, G. P. ..	Epping	53
Andrew, J. C. ..	Whittlesea ..	121	Christian Bros. ..	Doreen	41
Andrew, W. ..	Whittlesea ..	160	Clark, P. W. ..	Whittlesea ..	62
Andrews, E. H. ..	Templestowe ..	19	Clements, M. and L., and Son	Bundoora	135
Balharrie, J. A. ..	Whittlesea North ..	59			
Barclay, A. H. ..	Whittlesea ..	107	Cobain, J.	Thomastown ..	40
Barling, J. ..	Mernda	39	Collins, L.	Doreen	74
Batten, R. J. ..	Wollert	44	Cornfoot, D. H. ..	Whittlesea ..	25
Bebbington, J. ..	Whittlesea ..	92	Cotchin, J. ..	Woodstock ..	18
Benson, R. ..	South Morang ..	28	Coulthard, J. J. ..	Whittlesea ..	66
Bodycoat, A. ..	Wollert	39	Cox, E. H. ..	Lower Templestowe	37
Booth, Mrs. A. ..	Warrandyte ..	8	Craker, Mrs. E. ..	Warrandyte ..	2
Bourke, G. J. ..	Fairfield	82	Cumming, H. R. ..	South Morang ..	20
Bradbury, A. K. ..	Diamond Creek ..	31	Cunningham, E. C. ..	Templestowe ..	23
Buckley, F. J. ..	Mernda	104	Danaher, J. V. ..	Whittlesea ..	63
Bunting, J. ..	Epping	35	Danns, N. C. ..	Whittlesea ..	34
Butler, W. ..	Wallan	49	Dennett, C. A. ..	Cragieburn ..	38
Callaghan, L. ..	Epping	34	Deutscher, H. W. ..	Mernda	168
Callaghan, T. F. ..	Thomastown ..	40	Deveny, M. ..	Bundoora	51
Carr, W. J. ..	Wollert	65	Draper, L. S. ..	Wollert	31

TUBERCLE-FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name	Address.	Number in Herd at Last Test.
Drysdale, J. C.	Warrandyte	37	Nalder, H. S.	Epping	20
Evans, Miss M.	Bundoora	29	Nash, H. A.	Tullamarine	41
Fellows Bros.	West Heidelberg	52	Nebel, Mrs. A. E.	Thomastown	38
Fergusson, M. A.	Whittlesea	92	Norton, O. G.	Bundoora	37
Fitzsimons, B.	Lower Templestowe	30	O'Hern, T.	Epping	58
Fox, A.	Mernda	59	O'Loughlin, W. L.	Epping	27
French, T. W.	Wollert	43	Parker, Mrs. A. E.	Greensborough	24
French, W.	Greenvale	51	Patullo, F. E.	Mickleham	36
Gallus, E. A.	Doncaster	11	Pentland, C. V.	Templestowe	17
Gardiner, C. E.	Epping	20	Pettit, W. H.	Thomastown	36
Gibbs, C.	Arthur's Creek	28	Pitson, R H.	Yarrambat	17
Graff, Mrs. M. G.	Mernda	24	Power, L. J.	Mernda	52
Graham Bros.	Whittlesea	71	Quinlan Bros.	Epping	49
Green, W.	Mernda	11	Raper, L. R.	Greensborough	36
Hall, J. E., Mrs.	Whittlesea North	13	Rawlings, J. H.	Whittlesea North	41
Hancorne, Miss M. R.	Yan Yean	27	Righetti, L. A.	Lower Templestowe	40
Harding, J. E.	Templestowe	42	Robson, Mrs. G. A.	South Morang	47
Hargreave, Mrs. E. J.	Whittlesea	21	Rodgers, E.	Whittlesea North	11
Harkness, H. J.	South Morang	31	Rosewarne, Miss P.	Yan Yean	43
Harmer, R. E.	Wollert	38	Salcki, S.	Thomastown	51
Hawkes, Miss D.	Warrandyte	19	Seeber, B.	Thomastown	24
Hehr, H.	Epping	32	Shanks, John	Mernda	73
Hehr, R.	Wollert	23	Sheeky, A. A.	Templestowe	14
Henshaw, Miss A.	Templestowe	16	Short, E.	East Preston	99
Herd, J.	Epping	46	Siebel, F.	Thomastown	26
Hewitt, C. J.	Wattle Glen	8	Simpson, W. G.	Donnybrook	12
Higgs, R. N.	Yan Yean	76	Skals, P.	Rosanna	28
Hobbs, Mrs. F. J.	Doncaster East	6	Smirfitt, J. E.	Epping	39
Hobbs Bros.	Heidelberg	65	Smith, G. A.	Templestowe	63
Howden, A.	Epping	29	Smith, J. R.	Mernda	34
Howell, G. G.	Wollert	221	Smith, L. McA.	Yan Yean	2
Hughes, J.	South Morang	1	Smith, L. W.	Bundoora	73
Hussey, Mrs. S.	Warrandyte	1	Smith, P. A.	Ivanhoe	2
Jackson, Mrs. M. A.	Heidelberg	7	Smith, R. A.	Epping	27
Jenkins, T. H.	Whittlesea	24	Smith, S. E.	Epping	31
Johnstone, J. A., Miss	Mernda	14	Southon, H. W.	South Morang	27
Jones, A. J.	South Morang	30	Stephens, H.	Epping	48
Jukes, C.	Epping	39	Stimson, T.	Woodstock	33
Jukes, W. H.	South Morang	35	Tarry, J.	South Morang	24
Junor, G. M.	South Morang	37	Thomas, Mrs. E.	Broadmeadows	11
Kell, W. E.	Greensborough	21	Thomas, W. C.	Yan Yean	31
Lay, P.	Alphington	30	Towt, C. W.	Glenvale	136
Loft, A. H.	Wollert	52	Trethowan, F. W.	Donnybrook	94
Lynch, D.	Donnybrook	44	Trist, H. P.	Greensborough	8
McCormack, D.	Woodstock	33	Troutbeck, H. R.	Mickleham	47
McDonald, A. J.	Whittlesea	2	Vallence, C. A.	Epping	11
McDowell, R. H.	Greensborough	28	Van, E. L.	Templestowe	28
McGregor, W. B.	Mernda	41	Walsh, J. B.	Templestowe	11
McKay, J. M.	Coburg	62	Whelpton, B.	Whittlesea North	59
McKay, L.	Kal Kallo	12	White, W.	Greensborough	18
McKendry, J.	Doreen	47	Whittingham, E. W.	Greensborough	41
McKernan, A. H.	Whittlesea	24	Williams, E. A.	Thomastown	33
McKie, J. W.	Wollert	83	Williamson, J.	Doncaster (High-street)	5
McLean, J. F.	Bundoora	32	Willis Bros.	Craigieburn	61
McPhee, K.	Whittlesea	116	Wilson, J. E.	Diamond Creek	35
McPherson, A.	Yan Yean	64	Wilson, Mrs. M.	South Morang	14
Mason, N.	Donnybrook	52	Wood, A. V.	Yan Yean	125
May, Mrs. M.	Warrandyte	5	Wrest, W.	Epping	76
Mays, Mrs. A. M.	Doncaster	5	Wuchatsch, J. D.	Epping	14
Merriman, J.	Diamond Creek	17	Yann, R.	Wollert	52
Miller, A. J.	Whittlesea North	47	Young, Mrs. A.	Wollert	33
Miller Bros.	Greensborough	36	Ziebell, H.	Thomastown	32
Mosig, H. C.	Epping	24			

There are also 88 herds in which 3,660 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.



Contents

NOVEMBER, 1942

		PAGE
Agriculture and the War	*H. A. Mullett, B.Agr.Sc.*	553
Sows' Production Records	*N. C. Killeen, B.Agr.Sc., and S. H. Edwards*	562
Pasture Plants of Victoria—The Paspalum Grasses	*W. D. Andrew, M.Agr.Sc.*	563
Hugh Pye—Victoria's Pioneer Wheat Breeder	*H. C. H. Watson*	568
Potato Manurial Trials—1941–42 Results	*G. H. Mattingley*	570
Fowl Pox	*H. E. Albiston, D.V.Sc.*	578
Certified Pullorum Tested Flocks (Poultry)		580
The Beef Cattle Industry	*A. C. T. Hewitt, M.Agr.Sc.*	581
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	585
Restrictions on Stock Licks—Recent Order Explained		589
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	591
Garden Notes	*J. L. Provan, B.Agr.Sc.*	592
Investigations on the Gas Storage of Victorian Pears	*F. E. Huelin, B.Sc., Ph.D., and G. B. Tindale, B.Agr.Sc.*	594
Tubercle-free Herds (Dairy Cattle)		607

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

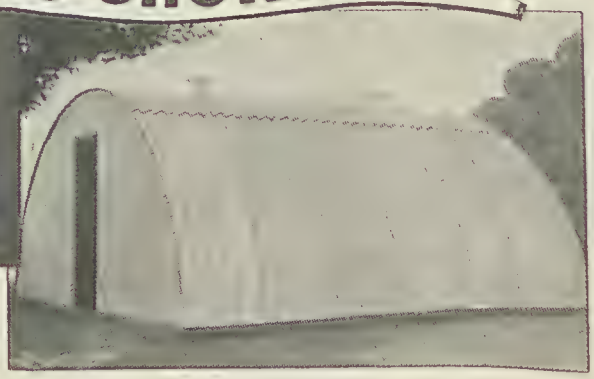
POSTAGE RATES

The postage required for this issue is:—To Australia and New Zealand, 1½d.; to United Kingdom, 2½d.; to United Kingdom via All-sea route, 1½d.; to other British Possessions 2½d.; to U.S.A. and Foreign Countries, 3½d.

FARM HOUSING SHORTAGE

solved by the new

JHARCO CABINS



The latest development in the use of Hardie's Fibrolite Asbestos Cement materials is the new Jharco Cabin. Its construction eliminates all unnecessary timbering by the use of three curved self-supporting corrugated Fibrolite Sheets bolted at the joints. As illustrated these cabins are ideal for the housing of land-army workers as well as providing additional simple and economical farm buildings.

HARDIE'S GENUINE FIBROLITE

ASBESTOS CEMENT BUILDING MATERIALS

INDEX TO ADVERTISEMENTS

FRONT SECTION

General Motors-Holden's Pty. Ltd. v
Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi
Hardie, James & Co. Pty. Ltd. ii
H. V. McKay Massey Harris Pty. Ltd. ... iii
International Harvester Coy. of Australia Pty. Ltd. iv
Law Somner Pty. Ltd. (Seeds) ... opp. p. 572
Leggo, Victor, & Farmers Ltd. ... inside cover
Shell Co. of Australia Ltd. ... opp. p. 573

BACK SECTION

Ajax Insurance Company Ltd. ... outside cover
Australian Barley Board (Barley Prices) x
Australian Cement Ltd. ... ... inside cover

BACK SECTION—*continued*

Blyth Chemicals Ltd. ix
Cameron & Sutherland Pty. Ltd. ix
Cockbill, J. viii
Davis Gelatine Pty. Ltd viii
Jeyes Fluid vii
Joyce & Co. Pty. Ltd. vii
Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 589
State Savings Bank xi
Trewhella Bros. Pty. Ltd. xi
Vacuum Oil Co. Pty. Ltd. ... opp. p. 588
Victoria Insurance Co. Ltd. vii
Victorian Railways xii
W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) x

The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

AGRICULTURE AND THE WAR

By H. A. MULLETT, B.Agr.Sc., Director of Agriculture

DURING the early part of the war the general public were prepared for some disturbance of their peace-time standards of living, but no one understood then that the exigencies of war would force man power and machinery to be diverted to war purposes to the extent that rationing of commodities, such as food and clothing, would be necessary. Now that we are experiencing these shortages, including shortages of foodstuffs such as potatoes, there is some confusion in the public mind as to the causes. On the part of some there is a disposition to believe that shortages could have been avoided by more efficient administration. To judge whether this is so it is necessary to consider the events which have preceded the present situation, and the administrative machinery concerned.

The Commonwealth Government is responsible for the direction of the war, including the production of essential foodstuffs. State Departments of Agriculture are subject to such direction, and they form part of the machinery for stimulating agricultural production, and their organizations have undertaken considerable war work. Broadly speaking, the normal administrative machinery controlling Australian agriculture is as under, but, as will be seen later, this has been considerably modified:—

(1) The Commerce Department, assisted by various Boards representative of producers and exporters, is the organization which administers the legislation regulating exports.

(2) The Council of Scientific and Industrial Research is the body responsible for fundamental agricultural research.

(3) The six State Departments of Agriculture are responsible for the administration of the legislation regulating production and conduct research, investigation, and extension services.

Co-ordination between the Federal authorities and between each of the State authorities is effected through the Standing Committee on Agriculture and the Australian Agricultural Council.

On the Standing Committee, the Commerce Department and each of the State Departments are represented by their respective permanent heads. The Council for Scientific and Industrial Research is represented by one or more of its members. The Standing Committee deliberates upon agricultural problems, both administrative and technical, and prepares and recommends proposals and plans for the guidance of the Australian Agricultural Council, which consists of the Minister for Commerce and the Ministers of Agriculture of the six States.

Where necessary, representatives of particular industries place their views before the Council, and, at times, mixed committees, comprising representatives of particular agricultural industries and the members of the Standing Committee, prepare plans for the Council, e.g., the apple and pear plan.

In the past the Agricultural Council has been the body which evolved, developed, modified, and approved the basic principles of much important legislation affecting Australian agriculture. In addition, many decisions have been made for the initiation of agricultural research, investigation, and extension, and for its better co-ordination. This legislation deals with a wide variety of subjects, and some of it has been directed towards ensuring that various agricultural industries received a measure of compensation for the increased costs on the industry due to the effect of the Commonwealth Government's policy of tariff protection. For example, the price of butter sold in Australia was raised as a result of legislation enacted by the Commonwealth and the States conjointly, and provision was made for the equitable distribution of this increase between all the butter factories, and each was required to bear an equitable financial share in the lower price received for butter exported.

Corresponding legislation for the wheat industry raised a tax on flour used for human consumption in Australia, and this enabled a price above export parity to be paid on all wheat consumed in Australia. Provision was made by which portion of the money raised by the flour tax was used for the elimination of the marginal areas in the wheat belt.

Prior to the war, the British market became saturated with imported agricultural produce, and at the instigation of the Council a Meat Board was set up for the purpose of regulating the supply of meat on to the British market, and a corresponding Board was set up for the disposal of apples and pears.

These matters are referred to because the functions of the Agricultural Council are not well known. The Council is an administrative instrument whose decisions have to be ratified by governments, and when this is done, either by Cabinet decision or by legislative enactment, they become acts of Government and are publicized as such, and rarely is the preparatory work of the Council mentioned.

When war became a possibility, the Commerce Department, in consultation with its Boards, prepared carefully detailed plans to prevent chaos in the export markets, and within a few months of the outbreak of hostilities had arranged contracts with the British Ministry of Food for the sale of about £84,500,000 worth of Australian produce; and the Agricultural Council considered schemes for the control of those industries, such as the apple and pear and wheat industries, the exportable surplus of which the British Government did not want.

In the first year of the war the following contracts were made with the British Government by the Commerce Department:—

Wool.—Entire clip sold for the duration of the war and one year after, at 13 7/16d. per lb. (Australian), worth	£54,000,000
Meat.—240,000 tons, worth ..	11,800,000
Butter.—75,000 tons, worth ..	10,700,000
Cheese.—13,000 tons, worth ..	950,000
Eggs.—900,000 long hundreds, worth	540,000
Sugar.—332,500 tons, worth ..	3,800,000
Dried Fruits	1,700,000
Canned Fruits	1,100,000
	£84,590,000

Also a large amount of wheat and flour, and miscellaneous produce.

Speaking generally, the prices were approximately 10 per cent. above the levels prevailing immediately before the war, and the quantities named, when calculated at the yearly rate, were sufficient to absorb any possible Australian surpluses. They furnished definite objectives for the producers and ensured price stability.

The marketing scheme evolved for apples and pears has been subjected to so much criticism that the hard facts that rendered the scheme necessary are rather obscured. The crux of the position was that the apple and pear crop

The Women's Land Army is doing a good job in supplying labour for increased primary production. [*Dept of Information photo.*

ting men on the march. Each one of us on the home front must work harder and longer to equip and provide for these men.

[*Dept. of Information photo.*

normally reached 12,000,000 cases yearly, of which 5,000,000 to 6,000,000 cases were consumed in Australia. Despite the desirability of increasing the consumption of apples and pears, and of processing the surplus in various ways, it was a physical impossibility to suddenly double the use of such luxury commodities—or anything like it. It meant, simply, that unless the surplus were kept off the market, prices would fall to disastrous levels. After consideration, it was decided to set up a Board to compulsorily acquire the whole of the Australian crop and distribute the proceeds, less administration costs, between the growers. The only way to obtain reasonable prices for the fruit was to keep the surplus off the market, and as it would not pay to pick and pack this surplus, it was decided, in the case of the poorest types of fruit and fruit in the most remote districts, to compensate growers on the basis of yields assessed on the trees. This is the reason why a proportion of the fruit was left to fall to the ground, an aspect seized upon by sections of growers, some of whom demanded the right to market all their fruit, regardless of what happened to the rest, and oblivious to the disastrous fall in price that would follow an open market.

Wheat, being an annual crop, could be treated on a different basis, and legislation was introduced setting up the Australian Wheat Board and the Wheat Stabilization Committee. Growers were guaranteed 3s. 10d. a bushel at ports, and subjected to control of the acreage planted each year to ensure that unmarketable surpluses would not be created.

The policy of eliminating wheat growers from marginal areas, which was initiated earlier by the Agricultural Council, was continued. Up to this time, beyond the two crops named, there was no violent disturbance of Australian agriculture. Indeed, the war had resulted in stabilizing overseas markets which, for some years, had reached saturation point, and in giving farmers slightly higher

prices than had prevailed immediately prior to the war. As a result of the action taken, the Australian agricultural economy ran so smoothly that farmers, other than the two sections brought under rigid control, were asking everywhere for a "lead" to do something special as a war effort to assist in feeding the population of Britain, but the British Government was the only government that could give the "lead," and the "lead" it gave was expressed in definite terms in the contractual obligations it entered into with the Commonwealth Government.

Next year the outlook shifted. There were considerable modifications in the British requirements, and also the special needs of the troops in the Middle East to be met. Heavy sinkings of ships, especially of refrigerated ships, and the "blitz" to which England was subjected, forced many changes. Short of ships, the British Government could not afford to send ships to Australia to make two trips a year when the same ships could bring similar food from the Atlantic coast of Canada and the United States of America, and could make five trips a year, or three from the Argentine in the same period.

Dried milk, condensed milk, and beef were given a high shipping priority, and butter, mutton, and lamb a lower priority. No shipping space could be found for eggs in shell; eggs had to be dried in plant rushed from China in order to prevent price chaos in Australia. The shipment of baconer pig carcasses was suddenly held up because they could not be processed in England, and the shipment of porker carcasses was requested.

Cheese, a readily portable food, which does not require refrigerated space in England, was asked for in increasing quantities, and nine new cheese factories were rushed up in Victoria.

To relieve the meat position, the export of the lower grades of meat was prohibited, and to stabilize the fat lamb industry the Commonwealth Government acquired in store all lambs not required for the local market. Collapse of mutton prices was avoided by placing large orders for canned mutton at prices somewhat in advance of the British contract price.

Then followed in quick succession the Japanese onslaught on the United States of America at Pearl Harbour, the loss of the balance of naval power in the Pacific, the fall of Singapore, the Philippines, the Netherlands East Indies, the direct threat to Australia, and the landing of United States troops in Australia.

Not only is the Women's Land Army increasing primary production, but it is releasing men for active service.
[*Dept. of Information photo.*

Vegetable plots on the north-south transcontinental road, tended by Australian troops. Water is obtained from bores. Large supplies of vegetables are grown, and the work put in by the men might well be an inspiration to us on the home front. [*Dept. of Information photo.*

The possibility of Japan entering the war as an Axis partner was, of course, foreseen, and, after consultation with the naval authorities, the British Phosphate Commission established rather more than a year's reserve of rock phosphate in Australia, but no one visualized even remotely the things that were to follow—the loss of Singapore and the devastating march southwards by the Japanese to the very coastline of Australia. To meet this threat there was a tremendous diversion of the nation's man power to the Armed Forces and to the manufacture of munitions. Large numbers of United States troops landing on these shores had to be fed with food produced here, and provided with a diet very different to our own.

A new Commander-in-Chief required the establishment of large reserve stocks of portable foodstuffs in strategical centres throughout Australia, and provision had to be made to ensure the maintenance of civilians as well as armies at widely different places in the event of invasion, especially if communications were cut.

More recently the need has arisen for Australian rice to feed Pacific Island populations, formerly supplied from the East. A special plea has been received from Great Britain for butter to eke out her margarine supply, which depends to an important degree on sources of copra that have now been lost. The need has even arisen for the quick growth of rubber in Australia.

The intensification of petrol rationing has affected agricultural production both quantitatively and qualitatively, and so has the loss of confidence by farmers in their ability to obtain labour, to procure duplicates for their machinery, and to have repairs performed.

One of the first effects of the landing in Australia of large numbers of American troops and the emphasis given in their dietary to beef and pig meat, to vegetables, fresh and canned, and to their liberal use of milk and eggs, was to produce shortages in these commodities. The Department of Supply immediately took steps to let contracts for the vegetables needed for military purposes and to stimulate their production through Agricultural Departments.

Including Navy beans, Tasmanian blue peas, canning peas, and tomatoes, contracts for the production in this State of approximately 40,000 tons of vegetables have been largely completed.

The Department of Commerce set up an organization with State Committees, with Department of Agriculture officers as chairmen, to increase the acreage of potatoes in each State by 50 per cent. over the acreage sown

during the past three years. This organization was given powers to regulate supplies from farmer to merchant and between States.

A campaign to increase pig and poultry production was undertaken, and to assist it the price of wheat for feeding purposes was reduced by 6d. a bushel.

It was arranged to work all milk condensories to capacity, and steps were taken to divert the necessary supplies from butter factories, and even from the whole milk supply of Melbourne.

Extensive additions to cool-storage space for meat and butter were built throughout Australia. Nine additional cheese factories and extensions to existing factories were arranged in Victoria.

The flax acreage was built up to a substantial extent.

The rationing of superphosphate was introduced and a priority system was established.

Extensive dehydration plants for vegetables have been brought into action to meet military requirements, and the reduction of meat by dehydration to a more portable form that does not require refrigeration is passing from the experimental to the commercial stage.

The export of dehydrated butter has already begun.

The foregoing are some of the steps taken to meet specific needs of the Army, but these requirements are so great that, coupled with man-power deficiency, reduced supplies of superphosphate, and those other factors cited as inhibiting production, it became necessary to make positive provision for the needs of the civilian population, and to take steps to introduce a measure of rationing, where this was necessary, to ensure that the specific quantitative and qualitative requirements of the Armed Forces and our Allies are met.

These, then, were some of the food supply problems which the Commonwealth Government faced recently, and it met them by setting up the Australian Food Council under the chairmanship of the Minister of Supply. On the Council the following Commonwealth Organizations are represented:—

The Supply Department,
The Commerce Department,
Prices Commissioner,
Department of War Organization of Industry,
Man Power,
Rationing Commissioner,
Council for Scientific and Industrial Research,
Navy, Army, and Air Force, and a Representative of the Allied Forces.

The Controller of Defence Foodstuffs is the Executive Member.

In close touch with the Council are the Commonwealth Statistician and the Australian Nutrition Council.

The functions of the Food Council are: To plan production of foodstuffs throughout Australia; to ensure that both service and civilian needs are met, and to provide for equalized distribution and control throughout Australia.

The Controller of Defence Foodstuffs deals with service requirements of the armed forces, and a special section of the Commerce Department handles civilian needs.

The Food Council is assisted in each State, except Victoria, by an advisory Council under the chairmanship of the State Minister for Agriculture. In Victoria no Advisory Council has been established on the ground that as the Department of Supply has its headquarters in Melbourne, it can readily obtain any technical advice it needs from its own technical officers there, and from the Department of Agriculture of Victoria.

The Agricultural Council and the Standing Committee on Agriculture are linked with

Australian troops manhandling a 25-pounder gun in New Guinea. Our fighting men deserve the best, and the best must be provided.

[Dept. of Information photo.

the Food Council through the Representatives of the Department of Commerce, which Department maintains the secretariat of the Agricultural Council.

I will illustrate the way in which this machinery works by reference to the proceedings of the meeting of the Standing Committee held a few weeks ago. The meeting was attended by representatives of War Organization of Industry, Man Power, the Commonwealth Statist, and Supply. The Food Council laid down what its requirements in food were for the Army, for the civil population, and for the Allied nations (including export to Great Britain). Target figures for the more important forms of agricultural production were drawn up by Commerce and War Organization of Industry, and tentative allotments were made to the various States on the basis of past capacity to produce, and, in the case of dairying, also in the light of forecasts of 1942-43 production, prepared by the Commonwealth Statistician on information received from Committees established in the local districts, and upon which butter-factory managers and man-power officers were represented.

A modern Victorian butter factory. This year's target for butter production in Victoria is 61,000 tons.

To reach target figures for dairying, an increase of about 34 per cent. over last year's production is desired, and, to do this, the survey showed that it would be necessary to replace some 6,000 men who had left the dairying industry. The tentative dairy produce quota allotted Victoria was: butter, 61,000 tons, and cheese, 12,000 tons. To attain these figures, War Production Committees will be set up immediately in the principal districts throughout Australia, under the chairmanship of officers of the Departments of Agriculture. Assisting these committees will be local committees in the sub-districts. The functions of these committees are explained by the following extract from a resolution adopted by the Standing Committee on Agriculture at its last meeting:—

"Standing Committee on Agriculture,
Item 2—Rural Industries.

3. (*a*) That the Departments of Agriculture in all States should proceed at once with the formation of District War Agricultural Committees (with subsidiary local committees in each district), as requested by the Director-General of Man Power.

(*b*) That Agricultural Departments should place suitable officers in charge of such committees, which should also have representatives of the farming and business community.

(*c*) That the Committees in each State functioning directly under the Department of Agriculture assist that Department in the following responsibilities:—

(i) Studying the man-power requirements and resources of the district and methods of organizing the labour supply.

(ii) Advising on the relative claims of different industries to the services of the available labour, having regard to the national production policy.

(iii) Co-operating with the Man-power Directorate in securing and utilizing for the priority industries of the district, labour required from sources outside the district.

(iv) Obtaining the production quota allotted to the district as part of national production goals.

(v) Collaborating with the Man-power Authorities and the representatives of the Commonwealth and State Statisticians in all matters affecting the district.

(*d*) That these War Agricultural Committees be approved as forming by their association

with the Departments of Agriculture, the Standing Committee on Agriculture, and the Australian Agricultural Council, part of the machinery for directing, stimulating, and controlling agricultural production during the war."

These proposals have now been approved by the Minister for Commerce.

The Committees will keep their eye on the man-power and production figures in each of the districts, organize district labour to best advantage by voluntary arrangement for pooling labour and machinery resources, arrange with the man-power authorities for essential seasonal labour, and generally assist in stimulating production in the directions required.

Seventeen regional Committees, consisting of five members each, comprising an officer of the Department of Agriculture as chairman, three producer representatives (nominated by producer organizations), and one representative having business experience nominated by the Shire Council, are being set up in Victoria. Their functions have been outlined. Briefly, they will advise on the most efficient organization of man power in the district, and attempt to attain the target figures for production allotted the district. Their present urgent function is to get in the grass-hay harvest, which was never more abundant than now, and, few as they are now, there will not be more men to do the job during the course of the war. Particularly will attention be directed to obtaining the most efficient use of all hay-cutting and harvesting machinery.

Flax is essential to the war effort.

In addition to this function, the Department has had to modify its organization and work considerably from peace-time requirements. Some 80 or 90 officers and employees have enlisted in the Armed Forces, and twelve have been loaned to Commonwealth Government Departments. Few of these officers have been replaced, because men to replace them are not available, and this deficiency has forced the Department progressively to reduce certain of its activities. Side by side with this reduction of staff have been the assumption of many new functions, but as no new staff were available the Department has had to suspend more of its activities.

The principal activities put aside for the time being are the research and advisory functions. The restrictions include severe reduction of the work on the State Research Farm, and particularly on the subsidized experimental plots on private farms throughout the State, of which normally several hundreds are conducted. Included in the work in country districts which has been drastically curtailed is that on the experimental plots on pasture sponsored by the Pasture Improvement League. Much of this work was valuable in providing supplementary information on differing soils and climatic zones, of work initiated at the Central Research establishment, and with its cessation there will occur a break in the data which the experiments were designed to provide, and a loss of the stimulus which the work and its exposition gave to local farmers. However, it has been possible to continue such work as wheat breeding where there is much valuable material which has taken years to produce, and which would be irreplaceable if lost. Much valuable extension work has been dropped, e.g., Crop and Fallow Competitions, and lectures.

Other curtailments are the utilization of the staff carrying out the Standard Herd Test for dairy supervision duties, while continuing the test by the regular dairy supervision staff; reducing the Burnley Egg-laying Competition to half its normal size; and other activities. Generally, duties of a routine character have been curtailed, and also the supervision of the duties of subordinate officers.

New functions assumed by the Department include—

(1) The conduct of Manpower and production surveys by arrangement with the Department of War Organization of Industry and the Department of Commerce.

(2) The preparation of expert reports for the Agricultural Council as a guide to action by the Council.

(3) The rationing of fertilizers and the rationalization of their use, including phosphatic, nitrogenous, and potassic fertilizers.

(4) Under the Commonwealth Apple and Pear Board, the whole of the Departmental Orchard Inspectors and Inspection staff, through the Superintendent of Horticulture, act as officers of the State Fruit Committee in the assessment of yield, inspection and supervision essential to this scheme, which is an integral part of the Commonwealth plan to prevent a surplus averaging 5,000,000 cases of apples and pears from breaking market prices in Australia and so ruining the growers.

(5) The growing of 40,000 tons of vegetables and pulse crops for the use of the Armed Forces as fresh and canned vegetables. Participation in the recent decision of the Allied Food Council to increase the canning of vegetables in Australia thirty times. This work includes campaigns to secure the necessary contracts, signing of contracts, supervising deliveries, grading the produce, certifying quality and claims for payment. The programme includes the growing of large areas of two crops new to Victoria, viz., 8,000 acres of Navy beans, and 4,000 acres of Tasmanian blue peas.

(6) On behalf of the Commonwealth Seed Production Committee, the growing of sufficient vegetable seeds to assist in making Australia self-supporting in this regard.

(7) Increasing the acreage of potatoes grown in Victoria by 50 per cent.

(8) Participation in and the servicing of the State Potato Committee, which is rationing growers' supplies on to the market, and through wholesalers to consumers.

(9) A campaign to increase the flax acreage from 8,000 to 34,000 acres. This work is being done for the Commonwealth Flax Committee, and includes the selection of farmers, the signing of individual contracts, the appraising of the crops, and certification of claims for payment.

(10) The stimulation of pig production to meet the increased requirements due to the war and in particular the current and future dietary requirements of the armed forces of the United States of America.

(11) Increasing substantially supplies of condensed milk, dried milk, and cheese.

(12) The conduct of a campaign to increase the production of tobacco in Australia with a view to reducing importations.

(13) Research and investigational work is being done by the Department in connexion with the growing in Australia of various drugs essential to the war effort, including ergot of rye, and poppies for the production of morphine, as well as technical service in connexion with the preservation of stored foodstuffs and textiles.

Baling Wire for Hay

The opportunity to conserve the plentiful supplies of grass hay available this year for use in feeding live stock must not be lost. The increased numbers of live stock at present being carried in the country will require adequate reserves of fodder for the winter period next year.

As a restricted quantity of baling wire is available, arrangements have been made with the Materials Supply Department to give priority, for the present, to farmers who are concerned with the baling of grass hay.

Persons requiring baling wire should forward applications at once to the Department of Agriculture, Melbourne, C.2, stating the quantity required, the purpose for which the wire is needed, and the name and address of the supplier from whom the wire has been ordered.

Sows' Production Records

Results at Rutherglen Experiment Farm

By N. C. KILLEEN, B.Agr.Sc., Science Field Officer, and S. H. EDWARDS, Field Assistant

A HERD of approximately 20 brood sows (grade Large Whites) and a registered Large White boar are kept at the Rutherglen State Experiment Farm, where experiments in pig husbandry are conducted with the herd and their progeny.

The routine management of the piggery includes keeping records of the farrowings and weanings of each brood sow. A summary of these records over the period of twelve months ended 30th May, 1942, is published below. These records were obtained under varying conditions of feeding and management. Therefore, they should be considered not as the best performances possible, but as an interesting contribution to authentic information on pig production.

These sows' production records cover a period during which the sows and litters were on trial in a test covering six different treatments as follow :—

(1) Sow and litter self-fed, run on pasture.
(2) Sow hand-fed twice daily, litter self-fed at creep, on pasture.
(3) Sow and litter hand-fed twice daily, on pasture.

The remaining three treatments were duplications of (1), (2) and (3) feeding treatments, except that sows and litters were kept in intensive pens with soil, but without pasture or green feed.

The foods used were wheat, pollard, meatmeal, lime and salt, and water. No milk was used.

As might be expected, the various treatments and individual sows gave widely varying results. The experiment has not covered sufficient sows or sufficient time to allow deductions to be safely made, but the total and average results of those litters provide the following summary.

During the twelve-month period under review, 22 sows farrowed litters. Of these, two farrowed only one litter, after which they were culled from the herd. In all, 35 litters were born during the twelve months, but four of these litters had not reached weaning stage at 30th May, and therefore are not included in the following averages, which cover 31 litters, seven of which were sows' first litters.

Summary

Total number of pigs born ..	375
Average number of pigs born per litter	12·1
Total number of pigs born alive	345
Average number of pigs born alive per litter	11·1
Average weight of litters (live pigs only) at birth	27·2 lb.
Average weight of live pigs at birth	2·5 lb.
Total number of pigs surviving at 4 weeks old	285
Average number of pigs per litter at 4 weeks old	9·2
Average weight of litters at 4 weeks old	115·9 lb.
Average weight of pigs at 4 weeks old	12·6 lb.
Total number of pigs surviving at 8 weeks old	285
Average number of pigs per litter at 8 weeks old (weaning) ..	9·2
Average weight of litters at 8 weeks old	257·6 lb.
Average weight of pigs at 8 weeks old	28·0 lb.

The heaviest litter at 8 weeks old was 404 lb. (11 pigs).

The lightest litter at 8 weeks old was 156 lb. (7 pigs).

WHEAT HAS EARS!

SO HAS THE ENEMY!

DON'T TALK!

Pasture Plants of Victoria

7. The Paspalum Grasses—
Golden Crown Grass (*Paspalum dilatatum*, L.)
Silt Grass (*Paspalum distichum*, L.)

By W. D. ANDREW, M.Agr.Sc., Assistant Agrostologist

This is the seventh of a series of articles presented in simple form to enable members of Young Farmers' Clubs and others to obtain an elementary knowledge of the pasture plants of Victoria. Previous articles appeared in this Journal as follow:—1. The Rye Grasses (February, 1941); 2. The Canary Grasses (June); 3. Weeping Grass, Scented Vernal Grass, and Veldt Grasses (October); 4. Barley Grasses (November); 5. Foxtail Grasses (December); 6. Cocksfoot and Timothy (January, 1942). An explanation of botanical terms used will be found at the conclusion of this article. For descriptive illustrations of botanical terms, readers should refer to previous articles.

THROUGHOUT the world there are some 200 species of paspalum, and most of these are to be found in tropical America.

In Victoria, two species are very common. One is a native known as silt grass or water paspalum; the other is golden crown grass, more commonly known as "paspalum," and it is an introduction from South America. Both are summer-growing perennial grasses of medium quality only, but are useful in association with other species.

The word paspalum is derived from the Greek *paspalos*, meaning a kind of millet. Strictly speaking, however, one does not regard paspalum as a millet, but reserves this title for such grasses as *Setaria, Echinochloa, Panicum*, &c.

Golden Crown Grass (*Paspalum dilatatum*, L.).

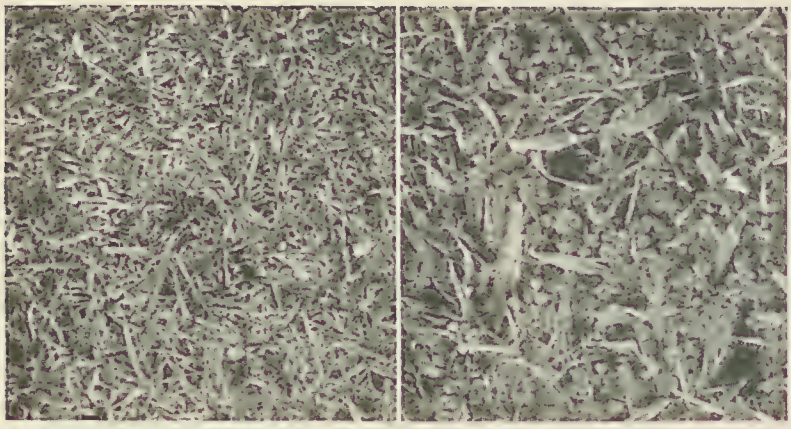
In America golden crown grass is widely cultivated, and is known as Dallis grass.

"Paspalum" was recorded as naturalized here in 1908, and is now widespread in southern Victoria and in the northern irrigation districts.

A great diversity of opinion exists as to the value of "paspalum" as a pasture grass. There is no doubt that it is quite useful under certain circumstances, for it combines an adaptability to wet conditions with a fair degree of drought resistance; but its fodder value is

Golden Crown grass.

[After *N.S.W. Agri. Dept. Bull. No. 59.*



Left—A sod-bound unproductive sward of "paspalum."
Right—Vigorous "paspalum" intermingled with other grasses and legumes.
[After *N.Z. Jnl. Agri.*

second rate, and it can become a weed in cultivated areas, channels, and drains, from which it is difficult to dislodge. "Paspalum" grows very strongly under irrigation, as the summer watering is ideal for its development. If, however, pastures can be watered frequently during the hot weather, one should aim at better species than "paspalum." On the other hand, if water is available only at infrequent intervals, and it is impossible to maintain cocksfoot and rye grass, then "paspalum" would bridge the gap between the spring and the autumn.

"Paspalum" commences active growth about November and grows vigorously throughout the summer and early autumn, becoming dormant during the winter. Its growth rhythm is, therefore, the reverse of perennial rye grass, but corresponds fairly well with cocksfoot, although its winter production is not as good.

Golden crown grass is unsuitable on its own for a pasture, and should be associated with other grasses and legumes.

On heavy to medium soils suitable associates would be perennial rye grass, cocksfoot, white, strawberry, and subterranean clovers, and, on lighter country which dries out more during the summer, annual species such as "Wimmera" rye grass and subterranean clover.

The necessity for keeping grass always in a short, leafy condition applies with greater force to "paspalum" than to most other species, as it becomes very coarse and stemmy if allowed to grow tall, and stock are then very reluctant to eat it. Heavy grazing in the summer is necessary to keep "paspalum" in check, and, if it shows signs of getting away from the stock, it is desirable to top it with the meadow-hay mower. A very necessary adjunct to grazing management is regular top-dressing with superphosphate to stimulate clover-growth. This encourages stock to keep the pasture grazed down.

Should "paspalum" be permitted to make strong growth during the summer, it will dominate the pasture and choke out other species, and in the course of time the "paspalum" plants become dense and sod-bound. In this condition the pasture has a very poor carrying capacity. The appropriate treatment under such conditions is to break up the sod in the late autumn by ploughing or using a "paspalum" renovator, and then sow a mixture of seed of suitable pasture species and superphosphate. Under ordinary circumstances these species will become well established before the regenerated "paspalum" commences active growth in the spring. Mechanical renovation without sowing seed or top-dressing does effect some improvement, but it is of a temporary nature only.

The best places to sow "paspalum" are in low-lying country, soak areas, or where there

The first stage in the renovation of sod-bound "paspalum."
[After *N.Z. Jnl. Agri.*

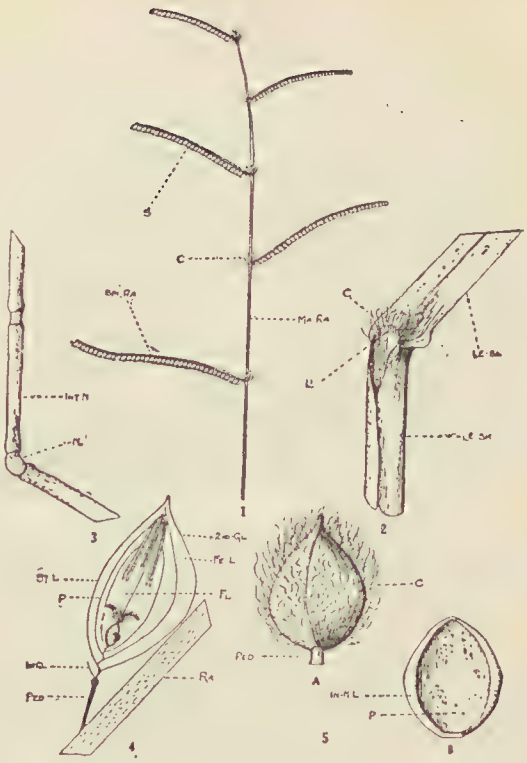
is a fair summer rainfall. Although it will persist under fairly dry conditions, it is unable to make any appreciable growth during the summer without irrigation. The seed requires fairly warm conditions for germination, and, although the plants sometimes show up prominently within twelve months of sowing, more usually one or two years elapse before "paspalum" becomes conspicuous in the pasture.

In sowing "paspalum" in the mixture, 2 to 3 lb. per acre is quite sufficient, as it soon asserts itself if conditions are favourable, and the difficulty then is to keep it in check.

The seeding heads often become infected with a fungus (*Claviceps paspali*) which is known as ergot, and cattle grazing where this is prevalent may develop a condition known as "paspalum staggers". When infection with ergot occurs the seeds do not develop normally, and in their place fruiting bodies (sclerotes) of the fungus form. At first these are whitish, but as they exude a syrup-like juice, which is ideal for the development of dark-coloured saprophytic fungi, the colour of the mature sclerotes usually ranges from yellow to reddish-black.

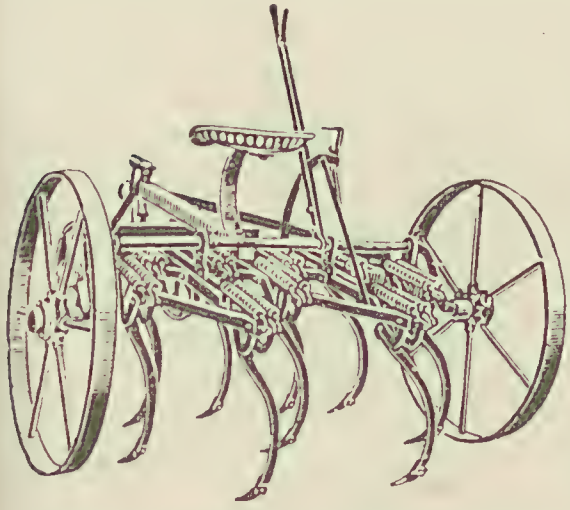
When any quantity of ergot is detected in a paddock, it is a good plan to top the pasture with a mower.

Seed.—Until fairly recently it was the custom to harvest seed by hand, but it is now becoming common to take it off with the header-harvester. The main difficulty is that the heads ripen very unevenly, and special



1. Inflorescence of paspalum dilatatum.
2. Leaf blade and sheath showing ligule and adjacent hairs.
3. Portion of stem near base of plant.
4. Diagram of spikelet showing relative positions of 1st glume (rudimentary), 2nd glume sterile lemma, and complete centre floret, consisting of ovary, stamens, and two flowering glumes (palea and lemma).

[After *N.S.W. Sc. Bull. No.* 59.



A special implement used for renovating sod-bound "paspalum."

[After *Qld. Jnl. Agri.*

attention to cleaning is necessary to remove non-germinable seed from the sample. Good seed should be plump and brown and free from ergot. As the seed of "paspalum" is light and bulky, only about 370,000 seeds go to the pound. Under the Victorian Seeds Act, 80 per cent. of non-germinable seed is permitted in seed sold for sowing or planting.

Identification.—"Paspalum" is a perennial bunch grass, and plants enlarge laterally with age, but do not send out runners like couch, kikuyu, buffalo grass, and the like. With proper management this grass will blend with other species to form a mixed pasture.

The leaves are devoid of hairs, dark-green in colour, and 6 to 9 inches in length. Usually their edges are puckered and tinged with purple. In well-grown specimens the broadest part of the leaf blade is a little less than half an inch. Young shoots are rolled in the bud

Silt grass (Paspalum distichum). Note the running habit of this grass and its resemblance to couch grass.

[After *Breakwell.*

and flattened. The stems are oval and the leaf sheath is hairless, although there are usually a few odd hairs near the base of the ligule, which is bluntly triangular in shape and about $\frac{1}{5}$ inch long.

Plants flower in the late summer and autumn and the inflorescence grows to a height of 3 feet or more. Each plant develops several flower stalks, and these are elbowed near the ground. Sometimes rooting occurs from the lower nodes of these stems in a manner similar to "Wimmera" rye grass (*Lolium* spp.).

The inflorescence of "paspalum" has a very distinct appearance, and is not likely to be confused with any of the other grasses cultivated in Victoria. It has a central axis, from which three to six arms, bearing double rows of spikelets, arise. Where these arms or racemes, as they are called, branch off from the main axis, there are tufts of white hairs.

"Paspalum" spikelets are built up on the same general plan as those of other grasses, but, as some parts are missing, confusion may arise on first examination. If the spikelets were complete, each would consist of two florets encased by two outer glumes. Actually, within each spikelet the centre floret is complete, and consists of an ovary, stamens, and two flowering glumes (palea and lemma), but the second floret is sterile and is represented by one glume only (a sterile lemma), while one of the outer glumes is missing, so that, although the spikelet appears to consist of a complete floret surrounded by two outer glumes, only one of these is an outer glume and the other is a sterile lemma. (See diagram on previous page).

The lemma and palea of the fertile floret are blunt, hard, and shiny, and the former is convex within-rolled edges, while the palea is slightly concave. The other glumes are of a papery texture, sparsely hairy, and the outer one has a fringe of hairs along its margin. Stamens and stigmas are purplish.

After fertilization has occurred the green spikelets turn brown, and at maturity break away as complete spikelets. Therefore, what are commonly referred to as seeds are really spikelets.

Silt Grass (Paspalum distichum, L.).

Silt grass is widespread in Victoria, but is not cultivated to any extent as a pasture grass. As its name implies, it is a water-loving grass, but, like "paspalum," it can withstand dry conditions fairly well.

In addition to being known as silt grass and water paspalum, it is also called mercer grass. The specific name "distichum" comes from the Greek *distichos,* meaning two rows, and this seemingly refers to the manner in which the spikelets are borne in two rows on the arms of the inflorescence.

Generally speaking, silt grass is regarded as more of a weed than a pasture plant, although under certain conditions it is a useful species. On the flats at Orbost, for example, silt grass provides useful grazing during the summer and autumn. It flourishes and is a nuisance, however, on areas cultivated for summer fodder crops, blocks up drains and irrigation channels, and quite frequently pushes its way up through asphalt and upsets brick drains.

Areas that are flooded during the winter, but are exposed or only shallowly covered with water during the summer, are suitable places for establishing silt grass, and it is a useful grass for planting in wet gullies that are subject to erosion. It is said to be capable of growing up through 2 feet of water.

Silt grass will grow satisfactorily in association with white and strawberry clover or with birdsfoot trefoil, but, as the seed is not available commercially, it must be propagated from cuttings. The best time to plant these is in the spring.

Identification.—Silt grass is a creeping grass that spreads by means of runners above (stolons) and below (rhizomes) ground. In the vegetative condition it resembles very closely the common couch grass (*Cynodon dactylon*), but if the leaves are closely examined it will be noticed that they have no hairs on the upper face, whereas the leaves of the couch have.

The inflorescence of silt grass is forked, and sometimes there is a third arm arising from below the junction of the upper two, whereas the head of couch grass has several radiating arms resembling the ribs of an umbrella. Spikelets are not prominently hairy and are more pointed than those of *Paspalum dilatatum*, but otherwise they are similar in structure.

The leaves of silt grass are a dull-green colour, have narrow points, are usually 2 to 3 inches long, although sometimes they grow to 5 inches, and they are about $\frac{1}{8}$ to 3/16 inch broad. Along their edges are glandular dots and some of these bear hairs. On the under-surface of the leaves there are scattered hairs, and where the leaf blade joins the sheath numerous fine hairs are present. The leaf sheath is split and has a hairy margin near the top, while the ligule is shiny and translucent and about $\frac{1}{8}$ inch in length.

GLOSSARY OF BOTANICAL TERMS

Anther.—That portion of a stamen which contains the pollen.

Auricles.—Lobes, most common at the junction of leaf and leaf sheath.

Awn.—A slender bristle, often the prolongation of a mid-rib.

Blade.—The expanded portion of the leaf.

Caryopsis.—The grain of a grass in which the seed coat is fused to the wall of the ovary.

Cilia.—Hairs like eyelashes.

Entire.—Without toothing or division.

Flowering Glumes or Pales.—The glumes which enclose the ovary and stamens. They are known as the lemma and palea respectively.

Floret.—The flower of a grass plant. When complete it consists of two flowering glumes or pales enclosing an ovary and stamens.

Glabrous.—Without hairs.

Glaucous.—Covered with a bluish-green bloom, e.g., as a cabbage leaf.

Glumes.—Paper-like structures which make up the grass spikelet.

Hybrid Plant.—A plant obtained by the fusion of the pollen of one species with the ovule of another.

Inflorescence.—A general term for a group of flowers.

Leaf Sheath.—Portion of the leaf which wraps around the stem.

Lemma.—The flowering glume which, with the palea, encloses the ovary and stamens.

Ligule.—The thin structure on the inside of a leaf at the junction of sheath and blade. It is sometimes reduced to a semi-circle of hairs.

Nodes.—The swollen, knotty portions along the length of the stem.

Outer Glumes.—The glumes which shield the florets.

Ovary.—The female part of the floret. It contains the immature seed or ovule.

Pale.—This term is used for either of the flowering glumes (palea or lemma).

Palea.—The flowering glume which is partly encased by the lemma.

Panicle.—A loose flower cluster.

Pedicel.—A flower stalk.

Peduncle.—The general term for the stalk of an inflorescence.

Protogynous.—A term used to indicate that the stigma matures before the pollen of the same flower.

Rachilla.—A secondary axis in the inflorescence of grasses.

Rachis.—The main axis of a spike or raceme.

Rhizome.—An underground creeping stem; "root-stock."

Seed.—After fertilization the ovule in the ovary develops into a seed (caryopsis). In most grasses this remains permanently encased by the flowering glumes or pales.

Spike.—An unbranched inflorescence in which the spikelets are sessile on the rachis.

Spikelet.—A group or a single floret shielded by one or more bracts or "outer glumes."

Stamen.—The part of the flower that bears the pollen. It consists of a pollen sack (anther) on a stalk (filament).

Sterile Glume.—A glume which does not contain an ovary.

Sterile Spikelet.—A spikelet which does not contain a fertile floret.

Stigma.—The receptive tip of the ovary. Grass florets usually have two stigmas.

Stolon.—A surface-creeping stem which usually roots at the nodes.

Tiller.—A sucker or branch from the bottom of the stem.

HUGH PYE . . .

Victoria's Pioneer Wheat Breeder

THE death of Mr. Hugh Pye, in his 83rd year, marks the passing of Victoria's pioneer wheat breeder and one of our first teachers of agricultural science.

The son of a school master, Hugh Pye was born at Mount Blowhard, near Ballarat, and adopting teaching as a career was appointed Science Master at Dookie Agricultural College in 1887, the year following its establishment. From 1894 to 1916 he was Principal of Dookie College, and from then until his retirement in 1931 was engaged solely in wheat breeding experimentation as Cerealist.

As a boy Hugh Pye was interested in plant breeding, and his appointment to Dookie gave him the opportunity to develop a hobby which later became an engrossing life work. At first his efforts were directed to the improvement of pastures by fostering the native grasses, but after coming in contact with William Farrer in 1889 he turned his attention to cereals.

The late Hugh Pye.

His first notable crossbreds were Improved Steinwedel and Bald Early, produced in 1893. Then, at intervals over the next 30 years, many successful new wheats appeared, including such familiar varieties as Warden, College Purple, Currawa, Major, Minister, Joffre, Gluclub, and Baldmin.

Paying tribute to Mr. Pye's contribution to the development of Australian wheat varieties, Mr. H. Wenholz, Director of Plant Breeding in New South Wales, in an article published in the *Agricultural Gazette* of that State, wrote:—

> "Pye had a predilection for club-headed wheats, and was the first wheat breeder in Australia to use the true club wheats (*T. compactum*) in crosses with common bread wheats (*T. vulgare*), deriving therefrom an increased resistance to the dry conditions which occur normally throughout most of the wheat belt in Australia. This character is well manifested in the variety Currawa, Pye's most notable production, which in 1925 was second only to Federation in acreage in Australia.
>
> "Pye also early foresaw the need for good baking quality in Australian wheat. Minister reached a high standard of such quality though not sufficiently productive, but in the production of Baldmin Pye confounded the critics who contended that high baking quality could not be combined with high yielding capacity in a wheat. By improvement on Baldmin in strength of straw and in flag smut resistance, an ideal Australian wheat will undoubtedly be evolved by future breeders with Pye's monumental work as a foundation."

In their day, Mr. Pye's wheats were widely grown throughout Australia, and added considerably to the national wealth, but, like Farrer's productions, they are gradually being superseded by more prolific improved varieties. Only a few months ago, in discussing the changes which have taken place in the varieties of wheat grown, Mr. Pye said:—

> "It is a healthy sign of progress. The present day plant breeders have far greater facilities for testing the yielding ability and quality of their crossbred material than we had. I am content to know that some of my wheats are the parents of the popular present day varieties".

Mr. Pye's conception of education was that agriculturists should be taught not only how to make a living, but also how to live. His life of service was surely an example of how to live in the best sense. Just as his friend Farrer's earnest desire to benefit humanity proved an inspiration to him, so the intellectual honesty and sincerity of purpose which Pye brought to his own work have stimulated later generations of students and plant breeders.

Another marked feature of his personality was his broad sympathy. His wide interests in literature, art, and natural science, and his kindly and generous disposition made him a genial companion and a charming host. He was not a fluent speaker, but enjoyed giving expression to whimsical thoughts in letters which have delighted innumerable friends.

Criticized as a faddist at first by many who could not appreciate his aims, Hugh Pye persevered to gain the appreciation and loyalty of those who benefited so greatly from his work, and in the peaceful evening of his days knew that contentment of mind which is the reward of work well done.

—H.C.H.W.

"S" for Silence

AUTHORITIES charged with the protection of military secrets in Australia appeal constantly to the public to co-operate with them by a self-imposed censorship on letters and conversation.

Notwithstanding these appeals it is possible almost daily to hear people who might be expected to know better disclosing facts which an enemy agent would be glad to learn, about defence organization, equipment, and troop movements.

One man receives a letter from his son stationed at an aerodrome. His son relates that this or that is being done by Allied or Australian airmen, and the father talks about it.

A woman learns from her husband in camp that he will be moving to a certain station in a week's time. She tells her neighbours.

A soldier having a drink with a pal in a hotel is indignant about some trouble or other in his camp, and proceeds to explain it for the benefit of his friend and other listeners.

In this way information leaks out and the work of the enemy agent is made easy.

The importance of this subject cannot be over-emphasized. Next to the national war effort itself, nothing is so vital to the defence of Australia as the safeguarding of military secrets. If the enemy learns in advance what we are planning, or what our equipment is, he is in a position to defeat our plans and turn the tables on us.

If, on the other hand, our intentions are unknown it is possible to take the enemy by surprise and turn the tables on him.

This is impossible, however, while great numbers of people go about telling all and sundry "what they know".

Garrulity in letters and conversation endangers our troops, affects the course of battles, increases the danger to our ships, and generally undermines the work done in military training camps and war factories. It nullifies or at the least exposes to possible failure the efforts of those who plan the defence of this country.

It is unpatriotic. It is, in a word, "sabotage". The person who divulges a military secret is really doing the work of the enemy agent.

The general public can combine to protect itself and to shorten the war by not divulging information. In this connexion the suggestion was recently made that every person writing a letter should write the words "S for Silence" at the top, and that any one hearing a person disclosing information in conversation should simply say "S". The success of the "V for Victory" campaign might well be repeated by an "S for Silence" campaign.

Potato Manurial Trials

RESULTS FOR 1941-42

By G. H. MATTINGLEY, Potato Field Officer

IN the early spring of 1941 potato crops in the market-garden areas near Melbourne appeared to be very forward, but cold weather during October retarded their growth to such an extent that the harvest was a little later than usual.

Some pea mite damage was observed in early crops in the Western District, and at Colac approximately 25 per cent. of crops were cut by frost. Yields from first early crops were good, up to 5 tons per acre being obtained; but, due to dry conditions, the second early crop failed to yield well, with the result that the "new" potato grade was extended until the end of April, so that adequate supplies would be available for civilian and army use.

Good strikes were obtained with late crops, but dry weather early in the New Year caused fears of light crops being harvested, while some grub damage was done to mid-season crops. However, crops made good response to rains received in February, and prospects for a reasonable harvest were considerably enhanced. Mild weather in April facilitated growth and benefited late crops to a large degree, with the result that the estimated yield for the State is 140,000 tons from the 35,500 acres planted.

Owing to the extremely wet weather experienced during the winter months, and the shortage of casual labour, digging in certain areas has been considerably prolonged. In some cases, losses have been incurred, through waterlogging of crops in low-lying areas.

The extension of the "new" potato grades for an additional two months resulted in many tons of small potatoes, normally used for seed purposes, being sold for consumption. This, together with an increased demand from New South Wales, where crops were very light, and the extra quantity required to plant the 50 per cent. increase in area sought for next season, has caused an unprecedented shortage of seed potatoes. So acute did this shortage become, that late in July the Potato Controller prohibited the use of potatoes of the Carman and Up to Date varieties for consumption, with the object of securing remaining stocks for seed purposes.

Because of heavy demands made by the Services and the general scarcity of supplies in other States, prices have been high throughout the season, and maximum prices as fixed by the Prices Commissioner have prevailed since July.

With regard to the various manurial trials, the season has been satisfactory, as in most instances fair yields of potatoes have been obtained. Of particular note is the fact that all crops were very free from blemish, and also the proportion of table-sized potatoes to others was unusually high.

It should be noted that, in the following tables of results, the cost of fertilizer is calculated to the nearest threepence from prices fixed in January, 1942, by the Prices Commissioner, less the Government subsidy of 25s. per ton for superphosphate. These costs do not take into account freight or spreading of the manure, as these are such variable quantities, but, because of the fact that some of the manurial dressings used may not be purchased ready mixed, it is assumed, for the sake of uniformity, that all fertilizers are purchased separately and an allowance of 8½d. per cwt. is made for mixing.

Contrary to the usual custom of calculating the return per acre on a basic price of £5 per ton for potatoes, it has been decided that, in order to bring the results into line with present-day prices, £8 per ton shall be taken as the basis from which to work. This is done in order to present the average of results obtained over a number of years in the light of prevailing conditions, £8 per ton being the minimum price to be paid for next season's crops grown under contract to the Commonwealth.

Mention should be made here of the fact that because of wartime exigency and demands upon officers of the Department of Agriculture for the performance of work of a more pressing nature, it has been decided that, for the

duration of the war, activities in potato experimental work will be restricted to the main plots at Warrenheip, near Ballarat, and the plots at Beech Forest, where new varieties are undergoing field trials.

The majority of plots have been in operation for at least ten years, and it is considered that results from these may now be regarded as conclusive. It is felt that, for the war years at least, the potato-growing community will be well served by the work now being carried out at Warrenheip and Beech Forest.

Potato experimental plots, Beech Forest.

Beech Forest—Jos. Knox

Two years ago, at the request of the Beech Forest and Otway Produce Society, the Beech Forest trials were transferred to a new location at Weeaproinah, where they are being conducted on the variety Up to Date. Table I. sets out the yields obtained last season, which conform generally to the pattern of the average results obtained from the same manurial treatments applied to the Late Carman variety.

TABLE I.—POTATO MANURIAL TRIALS, BEECH FOREST, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	4 9
Super., 6 cwt.	5 2
Super., 6 cwt. + amm. sulph. 1 cwt. ..	7 0
Super., 6 cwt. + amm. sulph., 2 cwt...	8 6
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	7 13
Super., 9 cwt.	7 0
Super., 9 cwt. + amm. sulph. 1 cwt. ..	7 13
Super., 9 cwt. + amm. suplh., 2 cwt.	8 6

Table II. shows the average results for the two years of the trials, and, as was the case with Late Carmans, best returns were obtained from the application of superphosphate 6 cwt. plus sulphate of ammonia 2 cwt. per acre. The use of potash is not warranted, as the increase in yield obtained was not commensurate with the cost.

TABLE II.—AVERAGE RESULTS, BEECH FOREST, FOR TWO YEARS, 1940-41 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 15	..	..	..	..
Super., 6 cwt.	6 4	2 9	19 12 0	1 11 9	18 0 3
Super., 6 cwt. + amm. sulph., 1 cwt.	6 19	3 4	25 12 0	2 9 9	23 2 3
Super., 6 cwt. + amm. sulph., 2 cwt.	8 18	5 3	41 4 0	3 3 6	38 0 6
Super., 6 cwt. + amm. sulph. 1 cwt. + pot. sulph., 1 cwt. ..	8 10	4 15	38 0 0	3 12 0	34 8 0
Super., 9 cwt.	7 3	3 8	27 4 0	2 7 9	24 16 3
Super., 9 cwt. + amm. sulph., 1 cwt.	8 12	4 17	38 16 0	3 7 9	35 8 3
Super., 9 cwt. + amm. sulph., 2 cwt.	8 17	5 2	40 16 0	4 1 6	36 14 6

Coragulac—T. J. Carmody

The Coragulac trial is conducted on the early crop of potatoes, being planted in August each year. On 7th August, 1941, the plot was planted with Up to Date, under a heavy growth of capeweed, on land which had previously been cropped with onions.

As will be seen in Table III., the effect of the various fertilizers on yield has been very slight, as has been the case each year at Coragulac. It is now evident that in normal seasons artificial fertilizers are of little value for the potato crop in this particular type of

soil. Table IV. shows the average results for the five years the tests have been conducted, and although the dressing of superphosphate 3 cwt. plus ammonium sulphate 1 cwt. shows an extra return of £2 0s. 3d. per acre, it is only in years of good prices that this dressing would be profitable.

TABLE III.—POTATO MANURIAL TRIALS, CORAGULAC, 1941-42.

Manure per Acre.	Yield New Grade Potatoes per Acre.
	T. C.
No manure	6 15
Super., 2 cwt.	6 3
Super., 3 cwt.	6 14
Super., 4 cwt.	7 6
Super., 3 cwt.+ amm. sulph., 1 cwt. ..	7 2
Super., 3 cwt.+ amm. sulph., 2 cwt. ..	6 8

TABLE IV.—AVERAGE RESULTS, CORAGULAC, FOR FIVE YEARS, 1937-38 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 13	..	..	..	..
Super., 2 cwt.	4 10	..	..	0 10 6	..
Super., 3 cwt.	4 15	0 2	0 16 0	0 16 0	..
Super., 4 cwt.	4 18	0 5	2 0 0	1 1 3	0 18 9
Super., 3 cwt. + amm. sulph., 1 cwt.	5 2	0 9	3 12 0	1 11 9	2 0 3
Super., 3 cwt. + amm. sulph., 2 cwt.	4 15	0 2	0 16 0	2 5 6	..

TABLE V.—POTATO MANURIAL TRIALS, CLARKE'S HILL, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	3 18
Super., 3 cwt.	4 0
Super., 1½ cwt. + amm. sulph., ½ cwt.	4 3
Super., 3 cwt. + amm. sulph., 1 cwt.	4 5
Super., 3 cwt. + amm. sulph., 2 cwt.	4 3
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 14

TABLE VI.—AVERAGE RESULTS, CLARKE'S HILL, FOR TWO YEARS, 1940-41 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	5 12	..	..	..	..
Super., 3 cwt.	5 17	0 5	2 0 0	0 16 0	1 4 0
Super., 1½ cwt. + amm. sulph., ½ cwt.	6 3	0 11	4 8 0	0 16 0	3 12 0
Super., 3 cwt. + amm. sulph., 1 cwt.	6 3	0 11	4 8 0	1 11 9	2 16 3
Super., 3 cwt. + amm. sulph., 2 cwt.	6 14	1 2	8 16 0	2 5 6	6 10 6
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph. 1 cwt. ..	6 16	1 4	9 12 0	2 14 0	6 18 0

Clarke's Hill—Labbett Bros.

The Clarke's Hill plot was established two years ago to ascertain the effect of the various manurial treatments on the heavier chocolate soils near Ballarat.

Table V. shows results with Snowflakes for last season, while the average figures in Table VI. seem to indicate that either heavy applications of sulphate of ammonia or a complete fertilizer are required.

Illowa—J. K. Sheen

The tests at Illowa, in the Western District, are also conducted on the early crop of potatoes. This year Up to Dates were used,

Striking results obtained at Fish Creek.
Left—No manure. Right—6 cwt. super. + 1 cwt. amm. sulphate.

The soil is a friable red volcanic loam, on the southern slopes of Tower Hill. The plot was sown on 23rd July, 1941, on seven or eight year old grassland, the seed going in under the sod as is common practice in the district.

Owing to the very dry growing season, slight and rather erratic response was made to the various manurial dressings (Table VII.). However, the average results quoted in Table VIII. show that an economic increase in yield can be obtained by the use of artificial fertilizers, the dressing of superphosphate and ammonia 3:1 being particularly recommended.

TABLE VII.—POTATO MANURIAL TRIALS, ILLOWA, 1941-42.

Manure per Acre.	Yield New Grade Potatoes per Acre.
	T. C.
No manure	4 19
Super., 2 cwt.	4 5
Super., 3 cwt.	4 0
Super., 4 cwt.	4 4
Super., 3 cwt. + amm. sulph., 1 cwt. ..	5 9
Super., 3 cwt. + amm. sulph., 2 cwt. ..	5 1

TABLE VIII.—AVERAGE RESULTS, ILLOWA, FOR NINE YEARS, 1933-34 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 17	..	..	..	..
Super., 2 cwt.	5 4	0 7	2 16 0	0 10 6	2 5 6
Super., 3 cwt.	5 10	0 13	5 4 0	0 16 0	4 8 0
Super., 4 cwt.	5 11	0 14	5 12 0	1 1 3	4 10 9
Super., 3 cwt. + amm. sulph., 1 cwt.	5 17	1 0	8 0 0	1 11 9	6 8 3
Super., 3 cwt. + amm. sulph., 2 cwt.	5 18	1 1	8 8 0	2 5 6	6 2 6

Musk Bull Bros.

Response to artificial manures at Musk last season was most marked (see Table IX.). Snowflakes were planted. The average results over a ten-year period (Table X.) show that sulphate of ammonia gives an economic increase in yield when mixed with 3 cwt. of superphosphate per acre.

Best results have been obtained by adding to the superphosphate, 2 cwt. of sulphate of ammonia, although the standard "3:1" gives good returns.

TABLE IX.—POTATO MANURIAL TRIALS, MUSK, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	2 0
Super., 3 cwt.	4 10
Super., 4 cwt.	4 12
Super., 3 cwt. + amm. sulph., 1 cwt. ..	5 10
Super., 3 cwt. + amm. sulph., 2 cwt. ..	6 2

TABLE X.—AVERAGE RESULTS, MUSK, FOR TEN YEARS, 1932-33 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 9	..	..	..	..
*Super., 2 cwt.	4 9	0 17	6 16 0	0 10 6	6 5 6
Super., 3 cwt.	4 14	1 5	10 0 0	0 16 0	9 4 0
Super., 4 cwt.	4 16	1 7	10 16 0	1 1 3	9 14 9
Super., 3 cwt. + amm. sulph., 1 cwt.	5 11	2 2	16 16 0	1 11 9	15 4 3
Super., 3 cwt. + amm. sulph., 2 cwt.	6 2	2 13	21 4 0	2 5 6	18 18 6

* Nine years only.

Neerim—J. P. Halvy

The soil at Neerim is peculiar, in that it gives very little response to sulphate of ammonia, but shows a beneficial increase in yield when sulphate of potash is applied. Warragul and Neerim soils are the only potato-growing soils in Victoria in which such a result has been obtained. Snowflakes were used for the trials.

TABLE XI.—POTATO MANURIAL TRIALS, NEERIM, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	6 8
Super., 4½ cwt.	10 5
Super., 6 cwt.	7 14
Super., 6 cwt. + pot. sulph., 1 cwt. ..	10 5
Super., 6 cwt. + amm. sulph., 1 cwt. ..	9 18
Super., 6 cwt. + amm. sulph., 2 cwt. ..	10 7
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	9 13

Table XII. shows average results for five years, in which it will be seen that dressings containing potash gave the greatest yields. An average increase of 25 cwt. per acre over superphosphate 6 cwt. alone has been obtained by the addition of 1 cwt. of potash. At £8 per ton this increase is valued at £10, whereas the cost of the 1 cwt. sulphate of potash is 21s. 6d.

TABLE XII.—AVERAGE RESULTS, NEERIM, FOR FIVE YEARS, 1937-38 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	5 16	..	..	..	..
Super., 4½ cwt.	7 16	2 0	16 0 0	1 3 9	14 16 3
Super., 6 cwt.	7 14	1 18	15 4 0	1 11 9	13 12 3
Super., 6 cwt. + pot. sulph., 1 cwt.	8 19	3 3	25 4 0	2 18 3	22 5 9
Super., 6 cwt. + amm. sulph., 1 cwt.	7 10	1 14	13 12 0	2 9 9	11 2 3
Super., 6 cwt. + amm. sulph., 2 cwt.	8 7	2 11	20 8 0	3 3 6	17 4 6
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	9 5	3 9	27 12 0	3 12 0	24 0 0

Romsey—Spring Bros.

The season was too dry to observe any increase in yield due to artificial fertilizers at Romsey. In fact, the plots receiving no manure gave the heaviest yield (Table XIII.). The variety planted was Late Carman.

However, Table XIV. sets out the average yields for ten years, and shows that definite and satisfactory increases in yield may be obtained by the use of artificial manures.

The standard superphosphate and ammonia 3:1 dressing shows an extra return per acre of £6 0s. 3d., with potatoes at £8 per ton.

TABLE XIII.—POTATO MANURIAL TRIALS, ROMSEY, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	2 15
Super., 2 cwt.	2 11
Super., 3 cwt.	2 11
Super., 4 cwt.	2 2
Super., 3 cwt. + amm. sulph., 1 cwt. ..	2 10
Super., 3 cwt. + amm. sulph., 2 cwt. ..	2 4

TABLE XIV.—AVERAGE RESULTS, ROMSEY, FOR TEN YEARS, 1932-33 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	4 11	..	..	..	..
Super., 2 cwt.	5 0	0 9	3 12 0	0 10 6	3 2 6
Super., 3 cwt.	5 2	0 11	4 8 0	0 16 0	3 12 0
Super., 4 cwt.	4 19	0 8	3 4 0	1 1 3	2 2 9
Super., 3 cwt. + amm. sulph., 1 cwt.	5 10	0 19	7 12 0	1 11 9	6 0 3
Super., 3 cwt. + amm. sulph., 2 cwt.	5 13	1 2	8 16 0	2 5 6	6 10 6

Toombullup—G. R. Stubbs

Yields in the North-East also were light last season. Table XV. shows the results, which always are indefinite and erratic in a dry season. Late Carman was the variety planted.

The average results for five years in Table XVI. show an increase in favour of superphosphate and ammonia 6:1, which gives an extra return per acre of £10 14s. 3d.

TABLE XV.—POTATO MANURIAL TRIALS, TOOMBULLUP, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No. manure	2 16
Super., 3 cwt.	2 8
Super., 3 cwt. + pot. sulph., 1 cwt. ..	3 2
Super., 3 cwt. + amm. sulph., 1 cwt.	1 19
Super., 3 cwt.+ amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	3 1
Super., 6 cwt.	3 3
Super., 6 cwt. + pot. sulph., 1 cwt. ..	1 19
Super., 6 cwt., + amm. sulph., 1 cwt. ..	4 7
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 5

Trentham—Toomey Bros.

The results with Snowflakes for last season at Trentham are set out in Table XVII. Satisfactory yields of good quality potatoes were obtained.

Average results (Table XVIII.) show that while superphosphate alone provides a certain increase in yield, best results are obtained by applying 3 cwt. superphosphate plus 2 cwt. sulphate of ammonia per acre to the crop. This results in almost doubling the yield received when no manure is used.

TABLE XVI.—AVERAGE RESULTS, TOOMBULLUP, FOR FIVE YEARS, 1937-38 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 3	..	..	..	..
Super., 3 cwt.	3 6	0 3	1 4 0	0 16 0	0 8 0
Super., 3 cwt. + pot. sulph., 1 cwt.	3 5	0 2	0 16 0	2 0 3	..
Super., 3 cwt. + amm. sulph., 1 cwt.	4 1	0 18	7 4 0	1 11 9	5 12 3
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 8	1 5	10 0 0	2 14 0	7 6 0
Super., 6 cwt.	3 15	0 12	4 16 0	1 11 9	2 4 3
Super., 6 cwt. + pot. sulph., 1 cwt.	3 13	0 10	4 0 0	2 18 3	1 1 9
Super., 6 cwt. + amm. sulph., 1 cwt.	4 16	1 13	13 4 0	2 9 9	10 14 3
Super., 6 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 14	1 11	12 8 0	3 12 0	8 16 0

TABLE XVII.—POTATO MANURIAL TRIALS, TRENTHAM, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	3 12
Super., 2 cwt.	5 0
Super., 3 cwt.	5 5
Super., 4 cwt.	5 2
Super., 3 cwt. + amm. sulph., 1 cwt. ..	6 15
Super., 3 cwt. + amm. sulph., 2 cwt. ..	6 17

TABLE XVIII.—AVERAGE RESULTS, TRENTHAM, FOR TEN YEARS, 1932-33 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 12	..	..	..	..
Super., 2 cwt.	4 12	1 0	8 0 0	0 10 6	7 9 6
Super., 3 cwt.	5 5	1 13	13 4 0	0 16 0	12 8 0
Super., 4 cwt.	5 6	1 14	13 12 0	1 1 3	12 10 9
Super., 3 cwt. + amm. sulph., 1 cwt.	6 5	2 13	21 4 0	1 11 9	19 12 3
Super., 3 cwt. + amm. sulph., 2 cwt.	6 17	3 5	26 0 0	2 5 6	23 14 6

Wheatsheaf—Bull Bros.

As is usually the case, no variation in yield was observed at Wheatsheaf in various plots treated with superphosphate alone. The addition of 1 cwt. of sulphate of ammonia to the basic superphosphate dressing of 3 cwt. per acre resulted in a satisfactory increase in yield (Table XIX).

In Table XX. the average results show an extra return per acre of £13 4s. 3d. from this treatment. The variety used was Snowflake.

TABLE XIX.—POTATO MANURIAL TRIALS, WHEATSHEAF, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	2 15
Super., 2 cwt.	3 2
Super., 3 cwt.	3 1
Super., 4 cwt.	3 7
Super., 3 cwt. + amm. sulph., 1 cwt. ..	5 0
Super., 3 cwt. + amm. sulph., 2 cwt. ..	5 2

TABLE XX.—AVERAGE RESULTS, WHEATSHEAF, FOR TEN YEARS, 1932-33 TO 1941-42.

Manure per Acre.	Average Yield per Acre.	Increase Due to Manure.	Value of Increase at £8 per Ton.	Cost of Manure per Acre.	Extra Return per Acre Due to Manure.
	T. C.	T. C.	£ s. d.	£ s. d.	£ s. d.
No manure ..	3 17	..	..	..	..
Super., 2 cwt.	4 6	0 9	3 12 0	0 10 6	3 2 6
Super., 3 cwt.	4 11	0 14	5 12 0	0 16 0	4 16 0
Super., 4 cwt.	4 14	0 17	6 16 0	1 1 3	5 14 9
Super., 3 cwt. + amm. sulph., 1 cwt.	5 14	1 17	14 16 0	1 11 9	13 4 3
Super., 3 cwt. + amm. sulph., 2 cwt.	5 17	2 0	16 0 0	2 5 6	13 14 6

Warrenheip—H. R. Huggins

Owing to a desire evinced by some district farmers to see the main potato experiment plots on a stronger type of soil than at Millbrook, these plots are now conducted at Warrenheip, on the property of Councillor H. R. Huggins.

As last season was the first year of operations on the new site, the results of the various trials are set down without comment. Besides manurial trials, various other methods of potato culture were investigated.

A Farmers' Field Day was held on these plots on 12th March last, and a large attendance of local growers showed keen interest in the work being done.

The first potato crop to qualify for seed certification in Victoria. It was grown at Weeaproinah.

TABLE XXI.—POTATO MANURIAL TRIALS, WARRENHEIP, 1941-42.

Manure per Acre.	Yield No. 1 Grade Potatoes per Acre.
	T. C.
No manure	4 8
Super., 3 cwt.	4 9
Super., 1½ cwt. + amm. sulph., ½ cwt.	4 13
Super., 3 cwt. + amm. sulph., 1 cwt. ..	4 18
Super., 3 cwt. + amm. sulph., 2 cwt. ..	4 15
Super., 3 cwt. + amm. sulph., 1 cwt. + pot. sulph., 1 cwt.	4 16

GREEN MANURING TEST.

Green manure is the name generally given to a crop which is grown specifically for the purpose of being ploughed under in order to enrich the soil from the chemical and bacterial standpoints, and to improve its physical condition.

Owing to the shift from Millbrook, the green manure crop of Sunrise oats was not sown till late; therefore, only 9 to 12 inches of greenstuff were ploughed down in September.

GREEN MANURING TEST.

Treatment.	Yield per Acre.
	T. C.
Bare fallow + super., 3 cwt. + amm. sulph., 1 cwt. per acre	4 1
Bare fallow, no artificial fertilizer ..	3 19
Green manure + Super., 3 cwt. + amm. sulph., 1 cwt. per acre	4 18
Green manure, no artificial fertilizer ..	4 8

CULTIVATION TESTS.

The purpose of the cultivation trial was to demonstrate that the potato crop benefits from inter-row cultivation which conserves soil moisture, kills weeds, and permits freer root movement and better tuber development. The final cultivation or moulding is of very great value in the control of the grub of the potato moth.

CULTIVATION TEST.

Treatment.	Yield per Acre.
	T. C.
Three cultivations	5 12
Two cultivations	5 11
One cultivation	4 10

Dipping Tests.

Potato seed is dipped in fungicidal solutions prior to planting, in order to control the various surface scab diseases, such as rhizoctonia. Owing to war conditions "Aretan" is now the only material available for this purpose.

Dipping Test.

Treatment.	Yield per Acre.
	T. C.
Seed untreated	3 15
Dipped formalin, 1 lb. in 20 gallons water	4 13
Dipped "aretan," 1 lb. in 10 gallons water	4 13

Storage Tests.

The present method of potato seed storage advocated by the Department of Agriculture was introduced to Victoria by Mr. J. T. Ramsay, potato expert to the Department. This method—the storage of seed in specially constructed trays—has proved to be economical and more convenient than any other method. By storing in this manner, a quicker and more even strike is obtained, and the sets are more able to withstand adverse conditions at planting time.

Storage Tests.

Treatment.	Yield per Acre.
	T. C.
Boxed seed	3 18
Seed stored in bags	3 7

Maturity Test.

The value of immature seed probably lies in the fact that seed so harvested is obtained before late season virus infections have had time to reach the tubers. Where little or no virus infection is present, it is doubtful whether immature seed would be of any greater value than normal ripe seed.

Maturity Test.

Treatment.	Yield per Acre.
	T. C.
Immature seed	5 11
Ripe seed	5 10

Certified Seed Test.

This test is designed to show the value of certified seed. Seed used in this test was from a line of potatoes that have been maintained at certification standard, at Millbrook, for four years by means of rigid selection, and seed purchased at random from a local grower who

Certified Seed Test.

Treatment.	Yield per Acre.
	T. C.
Certified seed	4 10
Ordinary seed	1 0

[*Continued on page 606*]

Shed for storage of seed potatoes, giving adequate ventilation.

FOWL POX

By

HAROLD E. ALBISTON, D.V.Sc.,
Director, Veterinary Research Institute,
University of Melbourne

FOWL pox is world-wide in its distribution, and constitutes one of the more serious diseases affecting poultry, at times producing heavy losses in commercial establishments. It is common in Victoria, varying somewhat in its incidence from year to year, and, while cases occur in all seasons, the disease frequently is more prevalent during the summer and autumn. In America, the reverse appears to hold, and in Europe it is a winter disease. Fowls and turkeys are especially susceptible to infection; pigeons also are susceptible although the causal agent appears in a modified form in these birds.

Cause

Fowl pox is caused by a filter-passing virus which is present in the scabs and diphtheritic membranes developing in infected birds.

As with many other viruses, the virus of fowl pox is remarkably tenacious of life, and suitably preserved material may retain its virulence for long periods. Dry powdered pox scabs have been found virulent after five years.

Age Susceptibility.—It is generally considered that birds of all ages are susceptible to infection with fowl pox, although in practice the disease is rarely seen in very young chickens, while it is not common in fowls over a year old. The apparent resistance of older birds is probably related to exposure to infection earlier in life, with a resultant immunity. Under natural conditions, fowl pox usually makes its appearance in birds when they are placed in the laying pens, and it may spread rapidly through the flock.

Breed Susceptibility.—All breeds of fowls are equally susceptible to artificial infection, but breeds with large combs appear to be more frequently attacked under natural conditions. Heavy breeds such as Plymouth Rocks do not become affected as commonly as White Leghorns.

Fowl pox lesions on the comb, the wattles, and the corners of the mouth.

Methods of Transmission.—Although injuries to the skin produced by pecking, or to the mouth by sharp grit, enable the virus to enter the body and produce the disease, the rapidity of the spread of fowl pox through a flock is attributable to the fact that mosquitoes can transmit the virus. These insects are capable of transmitting the disease fourteen days after taking up infectious material.

The relation of mosquitoes to the transmission of fowl pox probably explains the apparently greater susceptibility of breeds with large combs and the varying incidence of the disease at different seasons of the year. In America mosquitoes have been observed and collected in the depths of winter, and it is considered that they may shelter in chicken houses when the weather is very cold.

Fowl pox is usually more prevalent where mosquitoes are abundant. The eruptive lesions of the disease are seen in the parts of the body not protected by feathers, such as the comb and wattles, although all parts are susceptible

to experimental inoculation with the virus; and the appearance of the disease in flocks reared from the day-old stage on clean ground and in new buildings is explained by the role of the mosquito as a vector of the virus.

After the disease has been introduced, there is no doubt that some transmission takes place from bird to bird without the intervention of the mosquito, and here wounds in the mouth and on the comb and injuries to the skin of the feet and other parts of the body probably afford points of entry.

Incubation Period.—This varies according to the potency of the virus, and the individual susceptibility of the birds attacked. Generally it varies from three to twelve days.

Symptoms

Fowl pox may produce a variety of clinical conditions in fowls. For the sake of convenience, three clinical forms are described:—

Oculo-nasal Form.—The premonitory symptoms are dullness, loss of appetite, occasional sneezing. These are followed by the development of a watery discharge from the eyes and nose. The eyes become inflamed and swollen, and the eyelids tend to stick together with the tenacious exudate. Blindness may result, preventing the bird from feeding, and death takes place from starvation. The nasal discharge becomes purulent, and a uni- or bi-lateral swelling of the face is seen quite frequently, produced by the accumulation of a thick, cheesy exudate in the facial sinuses. The cleft in the palate may become occluded with the cheesy material, interfering with the normal passage of air, and giving rise to mouth breathing.

Diphtheritic Form.—In addition to the early signs described above, this form may commence with an occasional hard cough. An inflammatory condition of the mucous membrane of the mouth and pharynx then develops, followed by the formation of diphtheritic membranes. These deposits commence in the form of greyish-white plaques on the mucosa, which gradually extend and coalesce until the whole of the mouth may be involved.

The false membranes are dirty-greyish or yellowish, tough, and tenacious, and removed with difficulty from the underlying mucous membrane. When detached, they leave the underlying surface raw and inflamed, but the false membranes rapidly reappear. The formation of the diphtheritic material frequently extends to the larynx and trachea, and sudden deaths of fowls during an outbreak of fowl pox may often be ascribed to suffocation following the complete obstruction of the passage of air through the larynx by the diphtheritic deposits.

The absorption of toxic products from the lesions results in diarrhoea and emaciation, and death soon follows. A marked characteristic of the diphtheritic form of fowl pox is the nauseating, sickly smell which emanates from the mouths of affected birds.

Cutaneous Lesions.—These are usually found on the skin of the head, comb, and wattles, but may also be seen on the parts of the body incompletely covered with feathers. The lesions at first consist of reddish-grey papules, which gradually enlarge to become nodules. These develop into firm, rough, and wart-like growths, yellowish in colour at first, and gradually becoming darker until in old lesions they consist of black scabs. If the scabs are forcibly removed, the underlying skin is exposed as a raw, bleeding surface. When the cutaneous form appears alone, little disturbance of general health accompanies the infection, and recovery takes place in a fortnight to a month after the development of the lesions. In a number of cases, however, the cutaneous type is succeeded by the mouth lesions.

It must not be thought that the three types of lesions encountered in fowl pox are distinct entities. All three forms may be found in the same bird, but an examination of the individual fowls in an infected flock will usually show the presence of the three types, although at different seasons of the year there appears to be a tendency for one particular form to predominate.

Post-mortem Appearances.—In fowl pox, the lesions are confined to the skin, and mucous membranes of the eye, nose, mouth, pharynx, and upper respiratory tract. No lesions are to be found in the viscera.

Immunity.—Although there is a considerable variation in the degree of individual susceptibility to fowl pox, few birds possess a natural immunity. The degree of immunity, developing after natural infection, varies according to the severity of the attack—a mild form giving only a partial immunity, while a severe attack produces a well-marked and solid immunity.

For some years attempts have been made to develop a vaccine for the prevention of fowl pox. The most serious drawback to the development of protective inoculation against the

disease, however, is the difficulty in attenuating the virus to such an extent that it is not capable of producing the disease in inoculated birds. It may be stated that most vaccines for the prevention of fowl pox are capable of producing the disease unless great care is exercised.

Treatment and Control

The treatment of individual birds is inadvisable and useless. Many poultry farmers remove the diphtheritic membranes from the mouths of affected birds, using various antiseptics, but the course of the disease is not checked in this way, and the membranes form again rapidly. Once the disease appears in a flock, steps should be taken to prevent its spread. Poultry farmers who suspect the presence of fowl pox should seek the advice of the veterinary staff of the Department of Agriculture regarding the measures to be adopted for the control of the disease.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Date of Certification.	Number of Birds.
Reformatory Prison, Castlemaine ..	6.3.42	200
"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26.3.42	927
Stewart, J. A., Castlemaine	22.4.42	592
Rushton's Electric Hatcheries, (J. Rushton), Shepparton	28.4.42	653
Christie, R. R., and Son, Bentleigh ..	1.5.42	719
Becker, F. W., Cheltenham	1.5.42	315
Kostos, D., cr. Collins and Waverley roads	11.5.42	801
Evans, R., 50 Simpson-street, Kyneton ..	11.5.42	35
Throup, R. E., Neerim South	11.5.42	200
Berry, R., Campbell's Creek	11.5.42	87
Flack, Mrs. Florence, Horsham ..	11.5.42	100
Need, H. G., Warragul	15.5.42	254
Smith, R. Harcourt	15.5.42	97
Dookie Agricultural College, Dookie ..	19.5.42	447
Pettigrove, D. N., Kennington, via Bendigo	19.5.42	558
Wohlers, S., Jung	21.5.42	139
Throup, N. C., Neerim South	21.5.42	67
Mair, W. P., Tyabb	21.5.42	38
Horsfall, J. B., Lower Templestowe ..	26.5.42	720
Smith, F., Terang	1.6.42	947
San Miguel, Mrs. M. H., Box Hill ..	1.6.42	1,503
Rae, J., Sebastopol	1.6.42	1,497
Bartlett, O. E., Pimpinio	1.6.42	228
Cakebread, H., Shady Creek, via Buln Buln	3.6.42	112
Simpson, G. D., Tally Ho	3.6.42	680
Clark, H. N. Croydon ..	8.6.42	1,631
Abernethy, F. J., Horsham	.42	368
Heath, A. L., Spring Vale	8.6.42	130
Lowe, L. S., Bayswater	8.6.42	241
Youl, R. S., Wedderburn	8.6.42	757
Hewett, A., Bayswater	8.6.42	247
Thomas, Mrs. J., Outtrim	8.6.42	100
Barnes, J. H., Blackburn	8.6.42	978
Wimhurst, C. J., Tongala	8.6.42	417
Williams, V. (Wangaratta Hatchery), 91 Tone-road, Wangaratta	12.6.42	568
Kosch, E. W., Minyip	12.6.42	343
Mumford, L. J., Healesville	12.6.42	252
Broadbent, C. A., Yarraberb, via Derby	12.6.42	193
Massie, G., Shepparton	12.6.42	1,309
Shipp, R., Kerang	12.6.42	375
Hopkins, C. A., Shepparton	12.6.42	1,348
Hunt, R. R., Burwood	19.6.42	300
Henderson, C. W., Shepparton East ..	22.6.42	247
Mitchell, B., Kangaroo Flat	22.6.42	793
Gwyther, R. P., Highton, via Geelong ..	22.6.42	206
Hayes, R., Montrose	26.6.42	188
Sloan, G. J., Bayswater	26.6.42	191
Everard, H. L., Hawkesdale	30.6.42	321
Ridgway, G., Noble Park	30.6.42	76
Stephenson, Mrs. K., Research ..	2.7.42	93
Jones, M. A., Ringwood	2.7.42	283
Major, W. R., Girgarre	2.7.42	88
Walters, Mrs. V., Lower Templestowe ..	2.7.42	44
Grenville Stud Poultry Farm, Springvale South	2.7.42	1,640
Coupar, J. E., Nathalia	2.7.42	487
Clegg, R. M., Hamilton	7.7.42	14
Mackintosh, Walter C., Neerim South ..	8.7.42	194
Hurst, H., Eltham	9.7.42	913
Jackson, C. and H., Carrum Downs ..	9.7.42	94
Webb, A. E. H., Cranbourne	13.7.42	1,541
Scouller, R. C., Cobden	13.7.42	100
Gibbs, A. E., Stanhope	15.7.42	623
Abikhair and Tacey, Heidelberg ..	15.7.42	538
All Red Poultry Farm (E. M. Nichols), Yan Yean	15.7.42	460
Peck, D., Tally Ho	15.7.42	275
Pearse, Mrs. H. F., Donald	22.7.42	232
Hockley, N., Hamilton	22.7.42	22
Everist, F. R., Tyabb	29.7.42	40
Lumsden, R. G., Ballarat	1.8.42	11
Greenwood, J., Forest Hill	1.8.42	346
Bassett, R. A., South Muckleford ..	4.8.42	114
State Research Farm, Werribee ..	11.8.42	380
Hines, W. and C. A., Traynor's Lagoon, via St. Arnaud	12.8.42	1,096
Bradstreet, J. F., Tally Ho	22.8.42	120
Maher, A. E., Wal Wale	26.8.42	666
McKinnon, Miss M., Yielima, via Nathalia	1.9.42	113
Thomas, C. H., 325 Highbury-road, Burwood	2.9.42	142
Aitken, J., Silver-street, Cheltenham ..	16.10.42	727
Bethell, B., High-street, Templestowe ..	16.10.42	632
Gregson, R., Kyvalley	16.10.42	87
Hemphill, A. E., Monegeetta	16.10.42	401
Longerenong Agricultural College, Dooen	16.10.42	298
Mead, J. L., 28 Golf Links-avenue, Oakleigh	16.10.42	37
Nichols, W. G., Wandong	16.10.42	48
Stiles Bros., "Fair View," Wallan ..	16.10.42	784
Vogt, E. G., McSwain-street, Mentone ..	16.10.42	142
Wing Young, W., Dublin-road, East Ringwood	16.10.42	141

THE BEEF CATTLE INDUSTRY

By A. C. T. HEWITT, M.Agr.Sc., Live Stock Science Officer

THE beef industry has always been a major one in Victoria, but many factors have been responsible for a decrease in its relative importance, and its failure to progress and expand in the same way as dairying and fat lamb and wool production.

The beef industry is worth approximately £4,000,000 annually to Victoria, and as an industry it ranks fourth, being exceeded by the dairying, wool, and wheat industries, and is about equal to the mutton and lamb industry. Where dairying is possible, the returns per acre over labour costs are fully twice as high from dairying as from beef. In areas suitable for fat lamb production, the returns from sheep are half as great again as those from beef. Beef production offers a very low labour income, whereas with dairying the labour income is high, making it possible to conduct a dairy farm on small areas with a relatively small amount of capital. As a result, many beef-producing properties have been subdivided into dairy farms.

The Hereford is one of the most popular beef breeds.

The importance and value of beef are realized under conditions like the present when, through recent droughts, transport difficulties, and increased consumption, the supply is insufficient for the demand and the retail price increases. Normally, however, very few farmers are in a position to accept the returns from specialized beef production, with the result that most beef is now produced either as a sideline to sheep or dairying, or in rough country which is not suitable for more intensive methods of farming. Much fattening is profitably conducted on large holdings suitable for dairying because of the size of the holdings, and the ability of the owners to buy good stores cheaply and fatten them quickly and well.

The beef industry cannot be separated from the dairying industry, because approximately half the beef produced is from dairy cattle. It is estimated that, at Newmarket, 20 per cent. of the bullocks, 60 per cent. of the young cattle, and 60 per cent. of the cows sold for slaughter are dairy-bred stock, and that much larger percentages of dairy-bred stock are sold through other channels for slaughter.

The demand for culled dairy cows and other dairy-bred beef cattle is increasing, and the differences in price per 100 lb. between prime beef and the various classes of beef from dairy cattle have been growing less and less. Culled dairy cows and bulls are in demand for small goods and canning.

The actual value and relative importance of beef production are very difficult to assess from the few statistics available. There are approximately 2,000,000 head of cattle in Victoria, and of these about 1,600,000 are dairy cattle or dairy-bred steers, and about 400,000 are cows, heifers, calves, bulls, and bullocks of good beef type. The beef cattle numbers are maintained by breeding and importations from adjoining States. In 1941-42, 162,000 cattle, mostly beef stores for fattening and prime beef cattle for slaughter, were introduced from other States.

Normally 200,000 bullocks, 215,000 cows, and 85,000 young cattle are slaughtered

annually in Victoria. In addition, 330,000 bobby calves are slaughtered. These cattle normally produce about 2,330,000 cwt. of beef and veal, of which about 5 per cent., mostly boneless cow beef and bobby veal is exported. During the winter and spring when prime beef is scarce, appreciable quantities of frozen and chilled beef, averaging about 70,000 cwt., are imported from Queensland. Thus, nearly 2,300,000 cwt. of beef is consumed annually in Victoria, equal to 126 lb. per person each year. In addition, Victorians eat 75 lb. of mutton, 26 lb. of lamb, 8½ lb. of pork, and 10½ lb. of bacon, or a total of 246 lb. of meat each per year. The fact that over half the meat consumed is beef is due to both public taste and price, beef, taking the carcass as a whole, being much cheaper than bacon, ham, pork, and lamb, and usually about the same price as mutton.

It has already been mentioned that the beef and dairying industries are so interwoven that they cannot be separated. When the values of these industries are assessed, the value of beef and dairy produce only is taken into consideration. The value of the hides, tallow, bones, and other offal, worth nearly £1,000,000 annually, is assessed separately, and from these by-products leather, soap, glycerine, candles, glue, gelatin, margarine, buttons, stock food, and fertilizer are produced.

Breeds of Beef Cattle

The principal beef-producing breeds of cattle in Victoria are the Hereford, Aberdeen Angus, Shorthorn, Devon, Dairy Shorthorn, and Red Poll, all being of British origin, and all having been evolved within the past 150 years.

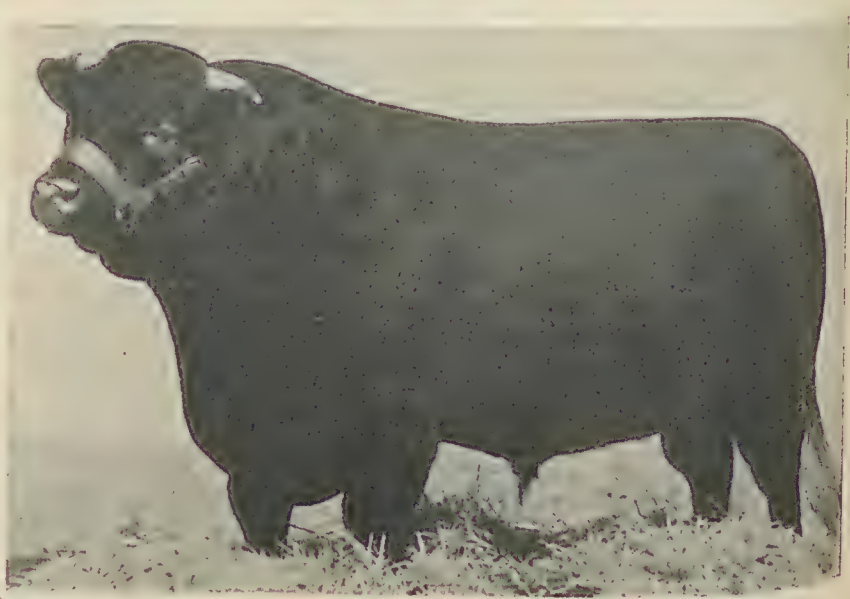
The most popular breed of beef cattle in Victoria is the Hereford, because of its ability to do well on hard, rugged country. The Shorthorn usually sells better than the other breeds, therefore it is favoured on good country, where it does equally well with the Hereford. The Aberdeen Angus is becoming more popular because it is polled, and produces smaller, chunkier joints. The Polled Hereford and Polled Shorthorn are slowly being developed, and should eventually replace many of their horned relatives.

A written description of the various breeds is of little value, as the inexperienced should learn to visualize the characteristics of each breed from a study of the cattle themselves as calves, as steers, as breeding stock, as fats, &c., and seek as much knowledge as possible from experienced stockmen. He should then study individuals from the time they come into his possession, until they reach the butcher's shop.

Evolution of British Breeds.

When the Romans invaded England nearly 2,000 years ago, the only cattle reported to be there were the small short-horned black Celtic cattle. In those days, and for many years later, the cattle from Lombardy, along the valley of the Po River in Northern Italy, were the most highly improved ones, and were noted for their size, conformation, and beef- and milk-producing qualities. To improve the native cattle, the Romans brought numbers of these Lombard cattle to Northern Europe and England. In colour they were mostly fawn and dun with white underparts, and in England they subsequently merged with the native Celtic cattle.

Five hundred years later, after the Romans left England, the country was subjected to invasions by the Angles, Saxons, and Jutes, and later by the Danes and other Norsemen, all of whom brought cattle from their homelands with them. These cattle were smaller

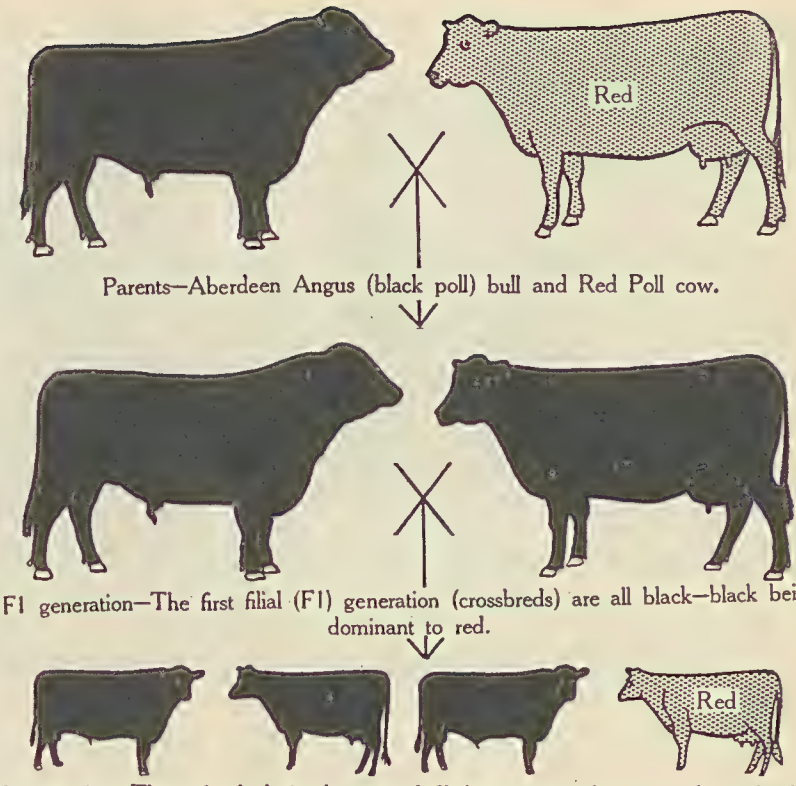


The Shorthorn is another leading beef breed.

than the Lombard cattle, and were brindle, red, and dun in colour. They also had a big influence on many present-day breeds.

The characteristics of the original black Celtic cattle are best seen to-day in the Kerry breed of Ireland and cattle native to the Shetland and Arran Islands, whereas the Welsh, Aberdeen Angus, and Galloway cattle are improved offshoots of this breed.

In the seventeenth and eighteenth centuries, Dutch and Flemish cattle were introduced to improve the local stock, and these apparently were responsible for increasing the size, improving the conformation and adding broken colour markings to many of the present breeds.



Parents—Aberdeen Angus (black poll) bull and Red Poll cow.

F1 generation—The first filial (F1) generation (crossbreds) are all black—black being dominant to red.

F2 generation—The individuals in the second filial generation (progeny of crossbreds) are black and red in the proportion of 3 to 1, irrespective of sex.

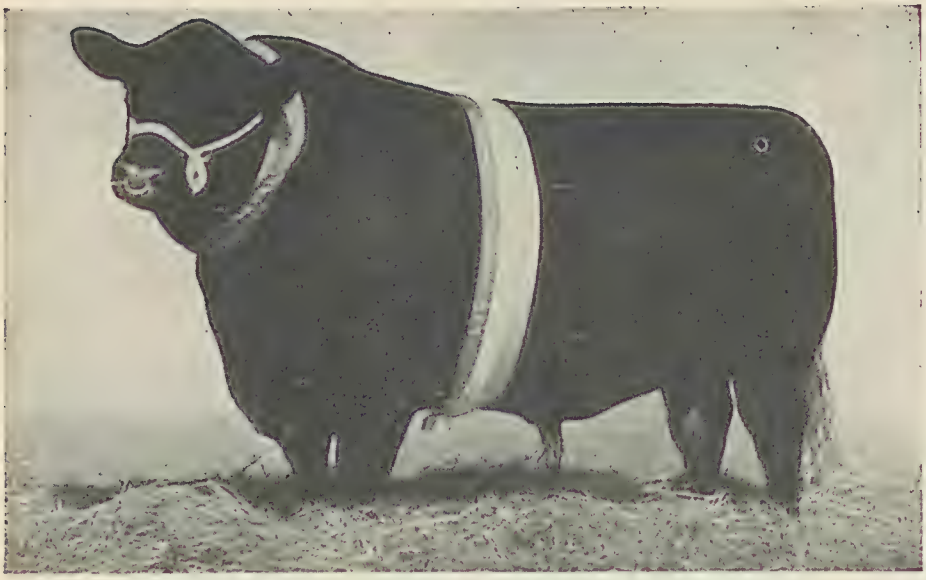
Chart illustrating Mendel's laws of dominance and segregation.

Principles of Breeding

The founder of systematic animal breeding was Robert Bakewell (1726-1795), of Dishley, Leicestershire, England. As far as cattle are concerned, Bakewell concentrated on breeding Longhorn cattle and, although this breed has never become famous, his lessons and methods of breeding were adopted by enterprising farmers in various parts of England where improvement of the local cattle into the present-day breeds began.

The basis of the improvement was mainly *better feeding* and *more rigid culling.* At the outset there was considerable cross breeding, and frequently first-cross sires carrying the desired characters were selected for breeding purposes. Later, selected animals carrying the desired characters were mated together to fix the characters on the theory that "like begets like". Animals that were considered to be outstanding were frequently bred to their own progeny and other closely related stock, and were used as long as they remained productive. Inferior animals were culled. Generally, the methods adopted were similar to the methods still used by the majority of present-day breeders.

It was not until the re-discovery of the work of the Austrian monk, Gregor Mendel, in 1900, that the principles of genetics became known, but as yet, due to the complexity of genetics, the simplest principles only can be practically applied to animal breeding. For instance, it is now known why throwbacks occur, such as horns occasionally appearing amongst polled breeds of cattle, and red animals occasionally cropping up amongst black breeds. When pure Red and Black Polls are crossed the progeny are all black in accordance with Mendel's *law of dominance,* as black is dominant to red, but these crossbred progeny also carry the factor for red which is recessive. Should these black crossbreds which are heterozygous (untrue breeding) for colour, be bred together, their progeny will be in the proportion of one homozygous (true breeding) black, two heterozygous blacks, and one homozygous red in accordance with Mendel's *law of segregation.* The homozygous and heterozygous black animals cannot be distinguished. If a red calf appears in a herd of Aberdeen Angus cattle the breeder can be assured that both the sire and the dam of this calf are heterozygous for colour, and carry the factor for red. The only reason why the bull may not sire another red calf in the herd is because all the other cows



Early maturity is a feature of the Aberdeen Angus breed.

are homozygous for black colour and their calves would be black even if mated to a red bull.

A pure-bred Aberdeen Angus bull will not throw a single red or red and white calf. Red animals are all homozygous for colour, because if they carried any other whole colour factor they would not be red.

When red cattle are mated to white Shorthorn cattle the progeny are roan because there is imperfect dominance, and when the roans are mated together their progeny will be in the proportion of one homozygous red, two heterozygous roans, and one homozygous white. Because of the imperfect dominance it is possible to distinguish between those animals which will breed pure for colour (the reds and the whites) and those which will not (the roans).

There are a number of contrasting factors which follow Mendel's laws in simple fashion, and the more common are:—

Black is dominant to red.
Whole colour is dominant to broken colour.
White head (Hereford) is dominant to other coloured heads.
Polledness is dominant to hornedness in females.
Polledness is imperfectly dominant to hornedness in males, abortive horns appearing amongst the bulls.
White colour is imperfectly dominant to both red and black colours.

The sire and the dam have an equal influence on the inheritance of the progeny. A prepotent parent is one that transmits a preponderence of desirable or dominant characters to its progeny. However, as breeders, the progeny of a prepotent parent are only midway between this parent and the other parent as the progeny derives half of its genetic factors from each.

About 1925, progeny testing along soundly recorded lines was first introduced into animal breeding programmes, but this as yet has received very little attention by beef cattle breeders. It is generally believed that, in the better herds of beef cattle and other classes of live-stock, perfection in general appearance and conformation, as measured by the eye, has practically been obtained, and that further improvement will be obtained only by some form of progeny testing. Improvement in the rate of growth, efficiency of live-weight gains over food consumed, dressing percentage, proportion of fat to lean, and the proportion of the more valuable joints to the inferior ones are some of the lines along which most improvement of beef cattle by breeding may be expected to occur in the future.

It is intended to publish a second article on the subject of beef cattle in a subsequent issue of this *Journal*.

DON'T Talk or Write about Troop Movements

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Pigs well bedded with straw on the property of Mr. L. H. Castles, Clarinda.

Farmyard Manure

THE increased prices of artificial fertilizers and blood and bone manures, and the difficulties of obtaining them, are directing more attention to the value and importance of farmyard manure. Unfortunately, in peace time, too little attention was paid to the collection and use of farmyard manure, and, under war-time conditions, many farmers desirous of utilizing their farmyard manure to the best advantage have not the facilities for handling it.

A pamphlet dealing with the uses of farmyard manure and methods of handling it is available, free of cost, on application to the Department of Agriculture, Melbourne.

Recognizing the value of farmyard manure, one of Melbourne's leading market gardeners, Mr. L. H. Castles, of Clarinda, established a piggery some years ago, largely for the purpose of producing manure for his vegetables. Not only does Mr. Castles obtain a regular supply of cheap manure, but he obtains a good income from this side-line from the sale of breeding and fat pigs. To some extent, the cost of feeding the pigs is kept down by feeding all waste and surplus vegetables. Mr. Castles uses plenty of straw in the sties to absorb the urine, and cleans the sties out each week, when the manure is usually carted direct to the vegetable patches.

Other market gardeners are keeping pigs and poultry as side lines, but it is more common for vegetable growers to obtain poultry, stable, and other farmyard manure from neighbouring poultrymen, horse-owners, and farmers.

The handling of manure from the cowshed in liquid form is being adopted more widely because of the ease of handling. All lifting is done by mechanically-operated pumps, and the manure is spread by gravitation from the portable tanks. Systems for handling liquid manure are described in detail in the pamphlet already referred to.

The analysis of a sample of liquid manure (dung, urine, and wash water) taken from the liquid manure pits installed by Mr. R. G. Caldecott, Tongala, whose system has been described in the above-mentioned pamphlet, is as follows:—

	lb. per 1,000 gallons
Organic matter	327
Mineral matter	362
Total solids	689
Nitrogen	14
Phosphoric acid	2
Potash	12

From this analysis, 1,000 gallons of the liquid manure is equal to 22 lb. of superphosphate, 24 lb. of muriate of potash, and 74 lb. of sulphate of ammonia, and is worth 15s. at present fertilizer values. In addition, the manure contains a very large amount of humus (organic matter) and other materials which have not been included in this valuation. Mr. Caldecott obtains about 8,000 gallons of liquid manure per month from his herd of 60 odd cows, and this is used to topdress 3 acres of pasture each month. In this way about 36 acres of pasture are topdressed annually, and this area receives approximately the equivalent of 1 ton of superphosphate, 1 ton of muriate of potash, and 3 tons of sulphate of ammonia, in addition to about 12 tons of organic matter. Without a system for collecting liquid manure, the bulk of these fertilizing ingredients would be lost in the drainage.

Dairy Cows

Interesting observations have recently been carried out at Cornell University, U.S.A., to obtain some information as to how the dairy cow spends her time, and it was found that, no matter how good the pasture, only eight hours a day were spent grazing. Twelve hours were spent lying down, when the cow is ruminating and resting, and the remaining four hours were spent standing around or wandering about. As little time as possible, therefore, should be taken for the milking operations, as time wasted at the milking shed is a loss of both rest and grazing for the dairy cow.

A cow is able to graze within half an inch of the ground, and it was found that on good succulent pasture, 4 to 5 inches high, a cow is able to gather about 150 lb. of herbage, containing about 32 lb. of dry matter, during the 24 hours. This is sufficient for a cow to produce about 4 gallons of milk daily. If the grass is long and coarse or too short, the amount grazed by the cow is very much reduced, because the cow does not graze any longer than the eight hours. On pasture alone, it is not possible, therefore, to maintain cows at their peak production for very long. Except during the flush period of the year, it was calculated that the average amount of herbage grazed would be about 50 lb. per day, and this is sufficient only for the maintenance of the cow.

The average width of a cow's mouth is 2½ inches, and the cow usually takes 50 to 70, and occasionally up to 90, bites per minute. Actually, while grazing, the cow is working fairly hard, as 150 lb. of grass would make a pile 6 feet in diameter and 3 feet high in the centre. To appreciate the amount of work actually performed by the cow, consider just how much work it would take to cut that amount of grass with a 2½-in. lawn-mower.

A very good irrigated pasture yields about 20 tons of herbage per year, which, if growth were regular throughout the twelve months and if there were no waste, would provide 120 lb. of green herbage per day, enough to maintain a dairy cow producing between 2 and 2½ gallons of milk daily.

However, growth is seasonal, and even with irrigation most of it is produced in October, November, and December, therefore the necessity for conserving this surplus growth as hay or silage for supplementary feeding later, to provide an even ration throughout the year, is obvious.

Cows do not necessarily graze for longer periods on sparse pasture than on good pasture, although they travel further for their feed, but they eat less food and lose condition and milk production suffers unless they are given the necessary supplementary feed.

Sheep

Dipping to destroy sheep ticks and lice should be done between shearing and mating, preferably immediately after shearing, although the Sheep Dipping Act provides that it may be delayed for 60 days if the sheep are kept in securely fenced paddocks.

Within 30 days of dipping a return on the prescribed form should be forwarded to the Chief Veterinary Inspector, Department of Agriculture, Melbourne.

The Sheep Dipping Act has recently been amended to legalize the use of approved power spray dips, and a further amendment provides that, if free from ticks and lice, shorn fat sheep and lambs may be removed from an owner's property direct to an abattoir or freezing works without first being dipped.

Make Pigs Heavier

The increasing supply of separated milk changes the dairy farmers' outlook towards pigs. Throughout the winter their problem was to keep the pigs growing with limited supplies of milk, which were in most cases supplemented by purchased grain or meal. Now the general problem is for the available pigs to consume the surplus separated milk.

Even when milk is plentiful, it is sound practice to feed grain at the rate of 1 lb. or more per head daily to growing and finishing pigs. If such a practice would create a greater surplus of separated milk, the remedy is to hold the pigs longer and carry them to heavier weights before marketing.

An extra 20 lb. of carcass on all pigs marketed would be so easily accomplished on most dairy farms now, and would help considerably to relieve the shortage of pig meats.

In holding pigs until they reach heavier weights, care should be taken to make them bigger, but not fatter. This can be achieved by keeping their food allowance at the same amount after they have reached the desired degree of fatness. For example, if pigs weighing 200 lb. alive are given as much as they can eat, they may consume 4 gallons of separated milk and 3 lb. of grain per head daily. With such a diet they will probably be increasing in liveweight at the rate of 2 lb. daily. If, instead of being marketed at this weight even though they are fat enough, they are kept for another two or three weeks on the same daily quantity of food, they will reach about 230 lb. liveweight. They will be longer, but not much fatter, because their growth rate will have decreased to about 1½ lb. per day.

[L. A. Downey, H.D.A., Pig Expert.]

What America is Doing in Live Stock Production

Mr. Claude R. Wickard, Secretary, United States Department of Agriculture, said recently, "Record supplies of high protein feeds are available this year for the biggest live stock population in U.S. history. I urge farmers to use this big protein supply to get peak production of live stock products.

"Farmers have made a remarkable record in increasing live stock numbers to meet wartime demands. This year we will have 18½ million more hogs than last year. The number of cattle on farms and ranches is the largest on record. There are more sheep and lambs than last year, and the number of laying hens has increased 14 per cent. The foods that will come from this record live stock population are those most needed by our armed forces and our allies. Feeding more high-protein feeds will give us increased production and more efficient production. It is good business and it is patriotic to feed better balanced rations this year. It will supply more food for war. That is the farmer's job." —(*Country Gentleman.*)

Poultry

Pullets intended for egg production should be well reared, so that they are well developed and constitutionally strong on reaching maturity. This is most important if they are to keep in good health during two or three laying periods in their permanent laying quarters under intensive conditions.

The laying houses must be rain-proof, and well-ventilated, but free from draughts. A concrete floor is safe, sanitary, and permanent, and when covered with clean straw the birds will be dry and comfortable. If the houses are cleaned out regularly at intervals of approximately three months, and clean straw added, it will prevent the accumulation of disease-producing organisms and eggs of internal parasites. This precaution, in addition to keeping the perches and surrounding woodwork free from red mite—the worst and most persistent pest with which the poultry farmer has to deal—will help to keep the birds in good health.

The number of birds that should be grouped together has always been a subject for discussion. Individual birds, placed in single pens, may lay more eggs than when a large number is kept in a flock, but this requires additional labour, and more costly sheds. If laying sheds are built 20 feet deep and divided into sections 20 feet wide, each will hold 100 laying birds comfortably without overcrowding.

The usual practice in feeding growing and laying birds is to give them all the food they can eat. A good variety of food, with a plentiful supply of tender greenstuff, shell grit, and clean drinking water is necessary to maintain good health and high egg production.

If the pullets have been bred from strong healthy stock, and are well cared for, very little culling will be necessary during the first laying season. It is only the obviously unfit, weak, or ill birds that should be eliminated from the flock.

[H. F. Clinton, Poultry Expert.]

Bees

As the yellow box trees are flowering and the red gum trees are well budded, it is essential that all extracting equipment be in first-class order, and that a plentiful supply of combs and full sheets of foundation be available to meet the needs of the rapidly expanding colonies.

Colonies should now be at their peak strength, and it may be advisable to remove some bees and a frame or two to check the

swarming impulse, but when frames are being selected care should be taken not to remove the queen.

While restricting the swarming impulse, new colonies may be formed or weak colonies strengthened by using the surplus bees and brood from strong ones. New colonies may be formed by placing about six frames in an empty hive with the entrance blocked and a screen nailed on top. To prevent fighting, drive smoke through the screen into the newly-formed colony, and, if fighting is still noticeable, spray the bees with a thin sugar syrup, using one part of sugar dissolved in eight parts of water. Place the new colony in a shady place until convenient for removal to a location beyond flying distance of the old stands. If given a well-developed queen cell and later a super, this new colony will soon be at honey-gathering strength.

Another method of preventing strong colonies from swarming is to place the strong colony on the stand previously occupied by a weak colony or strong nucleus, and to place the weak colony or nucleus on the original stand of the strong colony. When this is done the field bees from the strong colony return to the old stand and provide the necessary workers to build up the strength of the weak colony. If the bees show signs of fighting they should be smoked vigorously a few times.

It is essential to have a vigorous queen as head of the nucleus or weaker colony, otherwise the bees would be wasted in the exchange, as a poor queen could not maintain the strength of the added field force. In some cases it is advisable to cage the queen in the weaker colony for two or three days to protect her from being destroyed by the new field bees. The colony should be given ample room for expansion.

A weak colony may also be assisted by shaking the bees from combs of emerging brood from strong colonies, making sure not to remove the queen, in front of the weak colony when the bees are flying freely. The young bees will crawl to the weak colony while the field bees will return to their own stand. When this has been carried out a few times and sufficient bees have been added to the colony by this method, a frame of sealed brood can be given. This will reduce the danger of the brood being chilled, as there will be sufficient bees to cover it.

When brood and bees are given without taking the foregoing precautions, many failures arise as most of the field bees fly back to their old stand and leave the brood to perish.

In districts where cape weed has finished blooming, and a little time elapses before the main flow begins, colonies may be kept at strength by feeding about a pint of sugar syrup or honey at dusk until the new flow begins. Feeding between flows maintains breeding, and it is surprising how little food it takes to maintain a colony at full strength.

[W. A. Collins, Apiary Inspector.]

VETERINARY NOTES

Poultry Lice

Poultry lice, of which there are various kinds, cause itching and irritation which bring about general restlessness and interfere with growth, development, and egg production.

Good results in eradication may be obtained by the use of commercial sodium fluoride. If sodium fluoride is unprocurable, sodium silicofluoride may be used instead. Hold the bird on a table and apply a pinch next to the skin under the feathers, a pinch under the head, one on the neck, two on the back, one on the breast, one pinch below the vent and on the tail, and one on each thigh and on the underside of each wing.

An easier but not such an effective method can be used by mixing three parts of flour with one part of sodium fluoride, and dusting the bird thoroughly with a powder blower.

Another method of eradication of lice on poultry is to choose a calm night and apply a fine trickle of nicotine sulphate—40 per cent.—along the centre of the perches before the birds go to roost. A very small amount must, however, be used. The warmth of the birds causes the fumes to rise and penetrate the feathers. This treatment should be repeated once a week for three weeks to kill all the lice as they hatch out, as the eggs are not affected by the fumes.

Dust baths containing some tobacco dust or insect powders also may be used, but are not so effective as the individual treatment of the lice infested birds.

Sheep Tick and Sheep Lice

Unless controlled by dipping the sheep after shearing each year, ticks and lice may cause serious loss to sheep owners.

Ticks live in the wool of sheep, and in hot weather come to the surface, and may be seen on the outside of the fleece basking in the sun.

[*Continued on page 606.*

Restrictions on Stock Licks

Recent Order Explained

UNDER the Control of Stock Foods and Remedies Order, made recently by the Minister for War Organization of Industry, the manufacture of stock licks (except for mixtures of salt with copper or cobalt) and the use of phosphates for consumption by sheep have been prohibited, and salt for sheep can be procured only on a permit from the State veterinary authorities.

These permits to purchase salt for sheep will be given—

(*a*) When sheep are grazing in areas that are deficient in copper or cobalt and salt is necessary to induce the sheep to consume the very small doses of copper or cobalt required for health. The areas where copper or cobalt deficiency exists are well known, and are mainly in South Australia and Western Australia.

(*b*) When sheep are being fed mainly on cereal grains and it is necessary to supply them with an additional ration of lime. Here again the salt is needed as a bait to make the sheep consume carbonate of lime.

(*c*) The Chief Veterinary Officer of the State may give sheep owners permits to purchase salt in any other exceptional circumstances which warrant it.

The feeding of salt to sheep is a very old-established practice, and the use of proprietary stock licks containing various minerals has become widespread in Australia in recent years. It is natural, therefore, that the restrictions now imposed should cause anxiety to some owners of live stock, who fear that their flocks and herds may suffer in consequence. It is for that reason that this statement is made, setting out the true position and the reasons for the restrictions.

Before the restrictions were imposed they were discussed with the veterinary authorities in all States and with the Division of Animal Health and Nutrition of the Council for Scientific and Industrial Research. Approval was unanimous for the reasons which are set out in this statement.

Apart from phosphate and salt, the ingredients commonly used in stock licks are iron, sulphur, iodine, and magnesium. With one exception, there is no evidence that live-stock in Australia suffer from a deficiency of any of these minerals, and since they obtain all they require from their diet it is quite unnecessary, and hence wasteful and uneconomic, to continue providing them in the form of licks. The one exception is that pigs under artificial conditions, in pens with concrete or wooden floors, may suffer from a deficiency of iron which they normally obtain from soil eaten with their food. No special mineral mixture is required, however. Iron salts can be, and commonly are, purchased as such and added to the diet. Every State Department of Agriculture constantly gives advice on this.

It is useless to give additional minerals to stock unless they are suffering from an actual deficiency. In Australia there are deficiencies in certain areas of copper, cobalt, and phosphate, and when stock are fed largely on cereal grains additional lime may be required.

The deficiencies of copper and cobalt have already been referred to. The manufacture and sale of mixtures containing salt, copper, and cobalt is still permitted by the order.

The order provides also for salt to be obtained on permit when sheep are being fed cereal grains and need to be provided with additional lime. There is no need for mixtures of salt and lime to be manufactured. If stock are being fed on meal mixtures, it is best to add the ground carbonate of lime to the feed and thus ensure that it is taken. When whole grain is fed to sheep the lime may be provided in the form of a lick. This is merely a mixture of equal parts of salt and carbonate of lime which the owner can readily make for himself. The order provides for salt to be purchased for this purpose.

As regards phosphates, it has already been mentioned that the soils and pastures of some parts of Australia are low in phosphate content. Under these conditions cattle, particularly milking cows and breeding stock, benefit from an additional ration of phosphate, *but sheep do not.* It is not necessary here to discuss the reasons for this, but it can be said

that extensive experiments, continued over a number of years and carried out in widely separated parts of Australia, including Queensland, New South Wales, South Australia, and Western Australia, have shown, beyond doubt, that sheep are not benefited by giving them additional phosphate, even though the amount they derive from the feed may be extremely low. In spite of the publication of these results, many tons of phosphate were still being wasted in licks for sheep, although Australia needs all the phosphate that can be obtained from bone or mineral sources to make good the serious shortage of phosphatic fertilizers. The order, therefore, prohibits the use of phosphates for sheep.

There is no restriction on phosphates for cattle, but specially manufactured licks for this purpose are unnecessary. In the case of dairy cows, where the need is greatest, it is much better to add the phosphate to the ration when feeding, and thus ensure that it is consumed. The consumption of licks by stock is very irregular and some animals do not take them at all. Where beef cattle are concerned a simple mixture of salt and phosphate can be used, and this throws no great strain on the labour available.

So far, then, it is clear that the restrictions imposed will effect considerable savings and that they will not affect the live stock industry adversely in any way.

There remains for discussion the restriction placed on the use of salt for sheep. This has come as a surprise to many people who have assumed that salt was essential and that sheep would die, or at least fail to thrive, without it. The reasons for believing this assumption to be wrong therefore are given hereunder.

The fact that sheep will consume salt when it is offered to them is not proof that they need it.

Sheep grazing on coastal areas which are continually subject to wind-borne spray from the sea will still consume salt if it is offered to them, in spite of the additional quantity they obtain from the feed.

Many graziers do not provide their sheep with salt and others have given up doing so, on advice, and no harm has resulted.

Sheep have been kept on dry feed in pens and in various field experiments for some years without salt and have not suffered.

The Council for Scientific and Industrial Research has carried out a controlled experiment in South Australia, lasting three years, in which some sheep received as much salt as they liked to take and others received no salt at all. Those receiving salt showed no benefit from it whatever.

At the National Field Station, Gilruth Plains, Cunnamulla, which is conducted by the Council for Scientific and Industrial Research, all licks and salt have been withdrawn from the paddocks.

An experimental flock of ewes near Armidale, New South Wales, has been maintained under natural conditions since 1938 without salt. They have thrived and lambed normally.

In a field trial in New England one group of sheep has been kept under continuous grazing and another group under rotational grazing. The group grazed continuously thrived normally and grew average fleeces. The group grazed in rotation showed phenomenal growth and cut unusually heavy fleeces for the district. Neither group received salt nor any kind of lick throughout the experiment.

Other evidence could be quoted, but the foregoing should be sufficient to show that salt is *not* essential for sheep except in special circumstances. The order provides that when those special circumstances exist a permit to purchase salt for sheep can be obtained.

Finally, let us turn for a moment to what is, after all, the most important aspect of the matter. It is estimated that from 30,000 to 50,000 tons of salt are used annually for livestock in Australia. Much the greater part of this is used for sheep, and except in special circumstances, which are provided for in the order, this is unnecessary. As the Chief of the Division of Animal Health and Nutrition of the Council for Scientific and Industrial Research said in an address broadcast over all national stations in May last: "Common salt is commonly offered to sheep in the form of a lick, but there is nothing to show that under Australian conditions this practice is anything but wasteful and uneconomic. Think of the man power required to harvest, prepare, and load 30,000 to 50,000 tons of salt, and of the railway trucks needed to transport it from place to place. And think, too, of the fact, which is not generally realized, that salt is in short supply owing to man-power and transport difficulties. The demand for it for human consumption must be met, and it is widely used in numerous essential manufacturing processes. Large supplies are needed for munition making. Is it not better then, that what can be spared for live-stock should be conserved for *necessary* use rather than permit it to be used indiscriminately and needlessly."

IN THE ORCHARD

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Irrigation

FOR the irrigation of orchards adjacent to Melbourne, fruitgrowers rely on the storage which has accumulated during the winter in dams constructed on their properties, but it is necessary to supplement this supply with water from the metropolitan system. Most growers realize the value of watering for increased yields, but because the supply is expensive compared to that available in irrigation areas, every care should be taken to ensure that full benefit is obtained from water applied.

The method of applying water to the trees varies in different orchards. Some growers dig basins adjacent to the trees on the uphill side. These are connected to a standpipe or head ditch by galvanized-iron down-piping. This method is economical in water, but very little penetration of water beyond the area of each basin would occur, and as root development would be greatest in this area, the soil nitrates and other mineral nutrients in the remainder of the area would not be made full use of by the tree. There is a tendency for trees watered by this method to grow more vigorously on the side receiving the water. The presence of a deep basin also interferes with summer cultivation.

Another method is to construct check-banks across each land, the distance between each bank being equal to the distance the trees are apart. Starting at the top of the row of trees, the bays are filled in turn so that the area enclosed by each receives a thorough and uniform watering. The channel conveying the water to the bays is usually formed in the ridge along the line of the trees so that it can supply the bays on both sides of the row.

Other methods are used, such as the construction of several furrows on either side of the tree and allowing the water to slowly percolate down these channels. With this method, it is important to limit the length of these furrows, otherwise the top end of the run will be overwatered before the bottom end has received sufficient water.

Because of the heavy nature of the soils in the metropolitan area, watering is necessarily a slow job, but it is important to thoroughly wet the soil right through to the subsoil. If this is done, waterings need be less frequent and, in addition, fresh root growth will be encouraged throughout the depth of the soil instead of near the surface, which result is obtained from frequent light applications.

The ability of soil to absorb water rapidly and also to retain moisture during dry periods, may be largely increased by the addition of organic matter in the form of stable manure or green manure crops. The difference between orchard soils which have received large quantities of stable manure and those low in organic matter becomes most obvious when irrigation water is applied.

When trees have received extra water during the summer, new root growth is encouraged, but should the soil then be allowed to dry out, these roots will die and it may be found that the fruit ceases growing, a condition which

Two methods of irrigating fruit trees. Left—Furrow irrigation. Right—Basin irrigation.

further watering remedies only after some time. In order to keep the trees in a state of vigorous growth therefore, it will be necessary to study the soil and weather during the summer and make certain that the trees are receiving adequate water.

Codling Moth

Growers who have used tree bandages to trap codling moth larvae realize the usefulness of this method in reducing the moth population. Bag bandages are most suitable for pear trees or apples which have a rough-barked trunk. Chemical bandages involve less labour because they require no attention until the end of the fruit season, whereas bag bandages must be inspected at least every ten days. Before placing the bandages around the trunks at the end of November, all alternative cover for the grubs, such as loose bark, should be removed so that the bandages will then trap most of the grubs.

The use of white oil combined with lead arsenate at a strength of 1 gallon in 80 can be recommended for codling moth control, as it improves the efficiency of the lead spray as well as acting as an ovicide and killing numerous codling moth eggs. This spray also causes high mortality amongst the red spider population, the incidence of which seems to have increased in recent years.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley

THE soil has now become warm, and the problem for the next few months will be to maintain sufficient moisture in the surface soil for the annuals and shallow-rooted perennials, and enough in the subsoil for the large shrubs and trees.

The best methods of ensuring adequate moisture are to cultivate the surface soil frequently to destroy weeds and to allow water penetration, to spread a thick mulch over the surface to suppress weeds and keep the surface soil moist and cool and check loss of water by evaporation, and finally to apply water regularly and thoroughly. Merely sprinkling the surface of the soil and leaves of the plants may temporarily freshen the foliage, but it will not be of much value to the plants the next day. Less frequent, but heavy waterings are generally more useful to the plants.

Nitrates, which have such a stimulating effect on growth, are formed chiefly in the moist, warm, surface soil if plenty of humus is present, and the heavy waterings carry these nitrates down to the root zone.

November is the month to encourage growth of the summer flowering annuals and perennials. After they have made satisfactory growth, the conditions can be made harder for many of them to induce the production of flowers.

Salvia Splendens

Bonfire Salvia makes a very bright splash of colour in the garden, whether it is used as a border or massed in beds. The plants should be set out early this month, and the beds should be previously prepared by digging in well-rotted manure and blood and bone at the rate of 2 to 3 oz. per square yard.

Space plants 15 inches apart in rows 18 inches apart, and for massing effects the centre of the bed should be raised or mounded up. This plant, which grows about 2 ft. 6 in. tall, is really a perennial, but it is usually treated as an annual in Victoria.

Harbinger—a dwarf type of *Bonfire*—attains a height of about 15 inches, and has a more compact habit of growth than its tall relative. Spacing in this case should be 10 inches between the plants in rows 12 inches apart.

Rocket is another dwarf type, but the flowers are not so vivid as *Bonfire*.

Salvias are sun-loving plants, and should be planted in the open, but protection from strong winds is required.

China Asters

China asters—bright, large-flowered annuals are commonly, but incorrectly, called "asters." The true aster is a perennial. The annual "asters" are natives of northern China, and

although they do not have such a long blooming period as African marigolds and zinnias, they are very free-blooming and useful mid- to late-summer and autumn plants. They require a rich, loamy soil, but should not be over-fed, as this may cause "blind" blooms, and also fresh stable manure should not be used when beds are being prepared. Space the plants in rows 12 inches apart and about 10 inches between the plants. As a rule, they grow better in lighter types of soil than in the heavy types.

Unfortunately, the China aster is subject to Fusarium wilt, a fungous disease which causes the plants to become yellow and die. A number of wilt-resisting strains are now available, and these have reduced the incidence of this disease. If wilt appears amongst the plants, the affected ones should be removed and burned, and the spaces filled up from a reserve stock of plants in pots. Avoid excessive moisture around the plants and practice rotation, i.e., do not use the same piece of land to grow asters again for four or five years. A mulch of old stable manure, when the plants have become well-established, will be found generally beneficial.

Some of the best types are *Californian Giant, Giant Crego, American Beauty, Tasmanian Branching,* and *Royal Emperor.*

THE VEGETABLE GARDEN

The most important work in the vegetable garden now is hoeing, watering, applying side dressings of artificial fertilizers and mulching with stable manure or garden compost.

Cabbages and Brussels Sprouts

Seeds of *Drumhead* and *Enkhuizen Glory* cabbages may be sown in seed-beds this month. Do not cover the seed more than half an inch deep. Sift some old stable manure or well-rotted leaf mould over the seed bed, or provide partial shade by spreading over them light prunings from shrubs and trees, particularly when the weather becomes hot. This is a useful hint for all seed beds sown during the summer months.

When the young plants appear, protect them from the cabbage white butterfly by light, regular, dustings with arsenate of lead 50 per cent. dust, or spray with arsenate of lead powder ½ oz. (or 1 oz. of paste) to a gallon of water.

The popular varieties of Brussels Sprout are *Fillbasket* and *Covent Garden.* These may be sown now in the same manner as recommended for cabbages.

For good results in growing cabbages, and Brussels sprouts, it is essential to buy *good* seed. Not only must the seed be fresh and have a good germination, but it must also be a good strain of the particular variety selected. This is a very important point with plants in the cabbage family, because they are so easily hybridized. As a rule, amateur gardeners seldom take sufficient care in collecting their own seed of cabbages and related crops, and quite often failure can be attributed to this factor.

Dwarf French Beans

A sowing of beans should be made at monthly intervals until late January to ensure a continuous supply of this vegetable throughout summer and autumn. Good varieties are *Hawkesbury Wonder, Brown Beauty, Negro Long Pod,* and *Emperor William.* For those who prefer the butter or waxpod, *Startler Wax* may be sown. It is a good cropper, with round pods which are practically stringless.

Bean seed should be sown in drills, where the plants are to remain. Seed should be 1 to 2 inches deep and about 4 inches apart. Space the rows 2 to 3 feet apart.

In hot, dry weather, a careful watch must be maintained to detect the first signs of Red Spider attack, which appear like small, yellow, mottled areas near the base of the leaflet quite close to the mid-rib. The red spiders are very minute, and often difficult to detect with the naked eye, but if the mottled areas are noticed, a careful examination will reveal the attacker on the under-side of the leaves. Control measures should be applied at once, because in hot, dry weather, this pest increases very rapidly, and can do a lot of damage to many garden plants. Dust the underside of the leaves with fine sulphur. Choose a warm day, as the sulphur is most effective then. Make sure that the plants are adequately watered in the hot weather, and direct the water to the underside of the leaves to discourage the pest.

Investigations on the Gas Storage of Victorian Pears

By F. E. HUELIN, B.Sc., Ph.D.,* and G. B. TINDALE, B.Agr.Sc.†

Introduction

THE annual production of pears in Victoria (1938-9) is approximately 1,204,000 bushels. More than half of this production is represented by the Williams' Bon Chrétien (W.B.C.) variety, which is grown mainly for canning. The other varieties are marketed almost exclusively as fresh fruit, and the export trade before the war had assumed considerable proportions, about 300,000 bushels being exported annually, mostly to Great Britain. Apart from the W.B.C., the chief varieties (in order of decreasing importance) are Packham, Bosc, Josephine, Winter Cole, and Winter Nelis.

Experiments on the storage and ripening of pears have been conducted at the Government Cool Stores, Victoria Dock, since 1927 by the Victorian Department of Agriculture, and since 1932 under the direction of the Advisory Committee on Fruit Storage Investigations, comprising representatives of the Council for Scientific and Industrial Research and the Victorian Department of Agriculture. The first investigations were carried out on W.B.C. pears, as excessive wastage had developed in this variety during marketing in Great Britain, but the scope of the work was soon extended to include all the varieties mentioned in the preceding paragraph. Particular attention was given to determining the storage life at 32°F., i.e., the maximum period that pears can be kept in cool storage and still ripen satisfactorily after removal. The minimum temperature for satisfactory ripening was also determined.

The results of investigations conducted prior to 1938 have already been published (2). As a result of several years' work, it was found that the storage life at 32°F. and the minimum ripening temperature for the chief varieties of pears are approximately as follows:—

Variety.	Storage Life at 32° F. (Months).	Minimum Ripening Temperature (°F.).
W.B.C.	3	60
Bosc	3½	55
Packham ..	4½	45
Winter Cole ..	5½	40
Josephine ..	5½	37
Winter Nelis ..	6	37

During the past three years (1938-40) the investigations on pears have been devoted almost exclusively to determining the effect of gas storage, in which the fruit is stored in atmospheres containing considerably more carbon dioxide and less oxygen than occurs in ordinary air. The object of this work was to prolong the storage life and ensure the marketing of sound fruit of good quality over a longer period. It was hoped, by this means, to keep at least some varieties of pears for local marketing up to the end of the year. For export the shorter keeping varieties, such as W.B.C. and Bosc, were of particular interest, as these had given unsatisfactory results, and any extension of their storage life might be desirable. However, the high temperature required for ripening has been as big a factor operating against success with these varieties on the British market as has the short storage life. In the past this was particularly true of the W.B.C. variety, which normally arrived in England in March when atmospheric temperatures were approximately 45°F., about 15 degrees below the lowest satisfactory ripening temperature. W.B.C. pears have been excluded from export since 1939, and the exclusion of Bosc pears has also been under consideration.

* Research Officer, Division of Food Preservation and Transport, Council for Scientific and Industrial Research.

† Cool Storage Research Officer, Victorian Department of Agriculture.

Apart from the possibility of extending the storage life, information on the effect of gas storage is most desirable in relation to export, as accumulation of carbon dioxide has been known to occur in badly-ventilated ships' holds. Carbon dioxide in high concentrations can be definitely injurious, and it is, therefore, important to know the limit of safety.

Although the marketing of W.B.C. pears as fresh fruit has declined considerably, the canning of this variety is a most important industry in Victoria, and cool storage is playing a considerable part in its development. The pears are picked over a period of three weeks, but by means of cool storage the canning period can be extended by about ten weeks. After storage it is customary to raise successive batches to about 65°F. at intervals, in order to ripen them for canning. Any extension of the storage life of W.B.C. pears, such as might be obtained by gas storage, would correspondingly increase the canning period, and allow a larger quantity of fruit to be handled.

Experimental Procedure

Investigations have been conducted on the gas storage of W.B.C., Packham, Bosc, Josephine, Winter Cole, and Winter Nelis pears. The W.B.C. pears have been obtained from the Shepparton district in the Goulburn Valley, as this district is now the centre of the pear-canning industry, and by far the most important district for this variety. The other varieties were obtained from the Doncaster district near Melbourne. In 1940 two pickings of each variety were made about a fortnight apart, but in previous years only one picking generally was made.

Immediately after picking, the colour and firmness were determined, using a sample of five pears. The colour was recorded by reference to the Standard Pear Colour Chart, which was published with the previous paper (2) on pear storage and ripening. This chart included six colours, from Plate 1—deep green, to Plate 6—golden yellow. All the pears were fairly green at picking, and the colour was almost invariably less than Plate 2. In order to determine the ground colour of the russetted varieties, such as Bosc, Winter Cole, and Winter Nelis, it was usually necessary to scrape away some of the russet with a knife. The firmness of the flesh was determined with a U.S. penetrometer fitted with a plunger 5/16 inch in diameter.

The pears were usually stored at 32°F., but in 1938 Packham and Bosc pears were also stored at 36°F. Control samples were stored in air, and gas storage included the following five atmospheres:—(*a*) 5 per cent. carbon dioxide, 16 per cent. oxygen; (*b*) 10 per cent. carbon dioxide, 11 per cent. oxygen; (*c*) 5 per cent. carbon dioxide, 10 per cent. oxygen; (*d*) 5 per cent. carbon dioxide, 5 per cent. oxygen; and (*e*) 10 per cent. carbon dioxide, 5 per cent. oxygen. The pears were stored in gas-tight cabinets, and atmospheres (*a*) and (*b*) were maintained simply by controlled ventilation. The fruit in respiration produces carbon dioxide and absorbs oxygen in approximately equal amounts, and in gas storage by reduced ventilation alone the oxygen content of the atmosphere is reduced (below 21 per cent.) to the same extent that its carbon dioxide content is increased. To maintain atmospheres (*c*), (*d*), and (*e*) it was necessary to pass nitrogen from cylinders into the cabinets at intervals as well as ventilating with air.

The storage life both in air and gas was determined by removing samples of pears at fortnightly intervals and ripening at 65°F. Up to the end of the storage life the pears ripened free from disorders with maximum development of juice and flavour. Pears removed later ripened with inferior quality and, if appreciably over-stored, began to develop disorders on ripening. The end of the storage life of W.B.C. pears in air was fairly sharply defined, and disorders usually appeared as soon as there was any loss of quality. But in other varieties, and in gas stored W.B.C. pears, loss of quality occurred gradually over several weeks, and disorders did not develop until much later—unless the fruit was injured through excess of carbon dioxide or lack of oxygen.

Types of Wastage

The lesions which develop in over-stored pears after prolonged air storage have been described in the previous publication (2). In core breakdown the tissues in the region of the core soften, darken, and separate easily from the flesh. The breakdown may extend to surrounding portions of the flesh. Scald is characterized by darkening of the skin and a slight discolouration of the flesh. Core breakdown usually develops during ripening, but scald often makes its appearance after a prolonged period in cool storage. Pears which

have scalded in store remain hard on removal to higher temperatures, and completely fail to ripen. These disorders may also make their appearance after a prolonged period in gas storage.

Fig. 1.—Hard Heart in Williams' Bon Chretien pear.

In addition, two disorders have been frequently observed in gas storage, but rarely in air storage. A disorder which has not, to the author's knowledge, been previously described, and for which the most suitable term is "Hard Heart," has been frequently observed in pears stored in atmospheres containing 10 per cent. or more of carbon dioxide, particularly if gas storage is preceded by an initial period in air storage. The lesion is not visible externally, although most of the flesh may be affected. The affected area usually includes the core and some of the neighbouring flesh, and may even extend until it includes the whole of the fruit, except for a narrow band of sound tissue just underneath the skin. The sound tissue ripens normally after removal from storage, but the affected tissue, which has a sharply-defined boundary, remains hard and is probably dead. On cutting what appears to be a normally ripe pear, the knife encounters unexpected resistance due to the hard tissue in the centre. The lesion is not invariably discoloured, and in W.B.C. pears (Fig. 1) the affected area is hardly more coloured than the surrounding flesh. In Bosc pears (Fig. 2) the lesion is usually discoloured. For this reason the term Hard Heart is to be preferred to Brown Heart, which is a totally different type of gas storage injury in apples, first described by Kidd and West (1). Brown Heart is a rather inclusive term, as it might cover any type of internal discolouration, such as core breakdown, while Hard Heart is not subject to this objection.

The earlier picked W.B.C. pears are fairly resistant to internal injury in gas storage, but have sometimes developed an external disorder which may be described as a type of Lenticel Scald (Fig. 3). This disorder is negligible in continuous gas storage, and has occurred mainly in pears which have been gas stored after about six weeks in air. The characteristic appearance is most readily observed in pears immediately on removal from gas storage, when they

Fig. 2.—Hard Heart in Bosc pear.

are still hard and green. The scald then appears as somewhat diffuse spots around the lenticels. On ripening, the areas tend to extend and merge into one another, and the

lesion then bears more resemblance to ordinary pear scald, though it is still much lighter in colour and more blotchy.

Continuous Gas Storage

The effect of continuous gas storage on the storage life of six varieties of pears is given in Table 1. All these samples were gas stored within 3 to 4 days of picking.

All artificial atmospheres have increased the storage life as compared with air storage (except, possibly, in the Josephine variety), but the differences between them have not been sufficiently striking or consistent to select any particular atmosphere as the optimum. However, the atmosphere 5 per cent. carbon dioxide, 16 per cent. oxygen can be provisionally recommended as being the most reliable, and as giving nearly the maximum storage life in most cases. In this atmosphere the storage life was terminated by loss of flavour or core breakdown, and there did not appear to be any injury due to the artificial atmosphere. The atmosphere 10 per cent. CO_2, 11 per cent. O_2 has sometimes given rather better results, but the risk of injury leading to the development of hard heart is too great to permit the use of this atmosphere throughout the storage period. The maximum storage life could probably be obtained by storing in 10 per cent. CO_2, 11 per cent. O_2 for an initial period (the length of which would depend on the variety) and then changing the composition of the atmosphere to 5 per cent. CO_2, 16 per cent. O_2 by increasing the ventilation. This question will be discussed further in the next section.

Gas storage in the atmosphere 5 per cent. CO_2, 16 per cent. O_2, and 10 per cent. CO_2, 11 per cent. O_2 can be applied much more readily commercially as all that is required is a gas-tight refrigerated chamber and means of controlling ventilation. The atmospheres 5 per cent. CO_2, 10 per cent. O_2; 5 per cent. CO_2, 5 per cent. O_2; and 10 per cent. CO_2, 5 per cent. O_2 can only be maintained commercially by circulating the air from the gas-tight chamber

TABLE 1.—GAS STORAGE (CONTINUOUS) OF PEARS 1937-40.

Variety.	Date of Picking.	Colour.	Firmness (Lbs.).	Temp. (°F.).	Storage Life (Months).					
					Air.	5 % CO_2* 16 % O_2.	10 % CO_2* 11 % O_2.	5 % CO_2, 10 % O_2.	5 % CO_2, 5 % O_2.	10 % CO_2, 5 % O_2.
W.B.C.	29.1.37	¾	20	32	3½ c.b.	6 c.b.	6	6	3½	3½
	19.1.39	1¼	19	32	2½ c.b.	5 c.b.	6	..	..	..
	2.2.39	1¾	20	32	2 c.b.	4 c.b.	5 h.h.	..	..	..
	29.1.40	1¼	20	32	2½ c.b.	5½ c.b.	7	6½ c.b.	7½	7½
	8.2.40	1½	20	32	3 c.b.	5 c.b.	4½ h.h.	5½ c.b.	5½ h.h.	6½
Packham ..	28.2.38	1½	17	32	5½	7	8½	..	..	..
	,,	,,	,,	36	2½	3	4	..	..	..
	22.2.40	1	18	32	6	7	7½	7½	8	7½
	7.3.40	1¼	16	32	5	6½	6½	6½	8½	7½
Bosc	28.2.38	1¼	15	32	2½	4½	7	..	..	..
	,,	,,	,,	36	2 c.b.	3 c.b.	3 c.b.	..	..	..
	22.2.40	¾	19	32	3	7	7½	7½	7½	7½
	7.3.40	1¼	17	32	3	7	7	7	7½	7
Josephine ..	16.3.39	1¾	14	32	5	5½	6	..	..	..
	14.3.40	1	15	32	5½	5½	5½	6	5½	5½
	28.3.40	1½	15	32	5	5½	5½	6	6	6
Winter Cole ..	16.3.39	2	12	32	5	9	9½	..	..	..
	12.3.40	1	14	32	4½	9	9½	9½	9½	6½ h.h.
	27.3.40	1½	14	32	3½	8	9	8½	9	9
Winter Nelis ..	24.3.39	1¾	16	32	7	9½	9½	..	..	..
	12.3.40	1	20	32	5½	7	7	7	7	7
	27.3.40	1	18	32	5	7	7	7	7	7

* Atmospheres obtained by reduced ventilation.
c.b. = Storage life terminated by core breakdown.
h.h = Storage life terminated by hard heart.

over such an absorbent as milk of lime in a scrubber in order to remove part of the carbon dioxide. Hence the use of these atmospheres is not justified unless a storage life can be obtained greatly in excess of that obtained by reduced ventilation alone. This condition has not been fulfilled, as the atmosphere 5 per cent. CO_2, 10 per cent. O_2 has not given appreciably better results; the atmospheres containing only 5 per cent. of oxygen have sometimes increased the storage life still further, but in other cases have reduced it (to less than that obtained in 5 per cent. CO_2, 16 per cent. O_2) either through the development of hard heart or early loss of flavour.

The advantage of gas storage has differed considerably among the various varieties. On the average, gas storage in 5 per cent. carbon dioxide, 16 per cent. oxygen at 32°F. has increased the storage life of W.B.C., Bosc, and Winter Cole pears by about 100 per cent., Packham and Winter Nelis pears by about 30 per cent., and Josephine pears by less than 10 per cent. The value of gas storage is decidedly doubtful in the case of the last three varieties, as the storage life could probably be increased more readily by storing at 30°F. in air, though this temperature would involve danger of freezing unless it could be maintained more uniformly than is usual in commercial practice. With regard to the first three varieties, the results with W.B.C. pears are of particular interest, as they indicate what can be done by means of gas storage should it be necessary to extend the canning period. The extension of the storage life of Bosc pears is equally impressive, but extending the life of this variety would merely bring it into competition with the other longer-keeping varieties. The maximum length of life has been given by Winter Cole pears, and gas storage would allow of the marketing of this variety until December. The Winter Cole is possessed of particularly fine flavour, but it is only grown to a minor extent at present.

In 1938 Packham and Bosc pears were gas stored at 36°F. as well as at 32°F. The effect of gas storage on Packham pears was approximately the same at the two temperatures, but the Bosc pears at 36°F. did not respond nearly as well to gas storage. This result is difficult to explain, but it may have been due to the fact that the pears at 36°F. were gas stored in the same cabinet as Jonathan apples. The ethylene or other volatiles produced by the comparatively ripe apples would possibly reduce the storage life of the pears.

With regard to maturity, only in the case of the W.B.C. pears have the two pickings differed appreciably in their response to gas storage. The pears picked late in January have not shown any tendency to develop hard heart in 10 per cent. CO_2, 11 per cent. O_2, while those picked about ten days later have been highly susceptible to this disorder. It has been previously stated (2) that ground colour is a fairly reliable index of maturity as pears which are colouring even slightly will not store well. Ground colour, however, is inadequate to distinguish these two maturities, as they are both fairly green, and differ very slightly in ground colour. They have approximately the same storage life in air at 32°F., and it is only in the response to gas storage that the two pickings are sharply distinguished. The firmness of the flesh has not differed significantly in the two pickings.

Fig. 3.—Lenticel Scald in Williams' Bon Chretien pear.

Colouring in Gas Storage

In addition to extending the storage life, gas storage has retarded colouring, and typical results for W.B.C. pears are given in Figs. 4

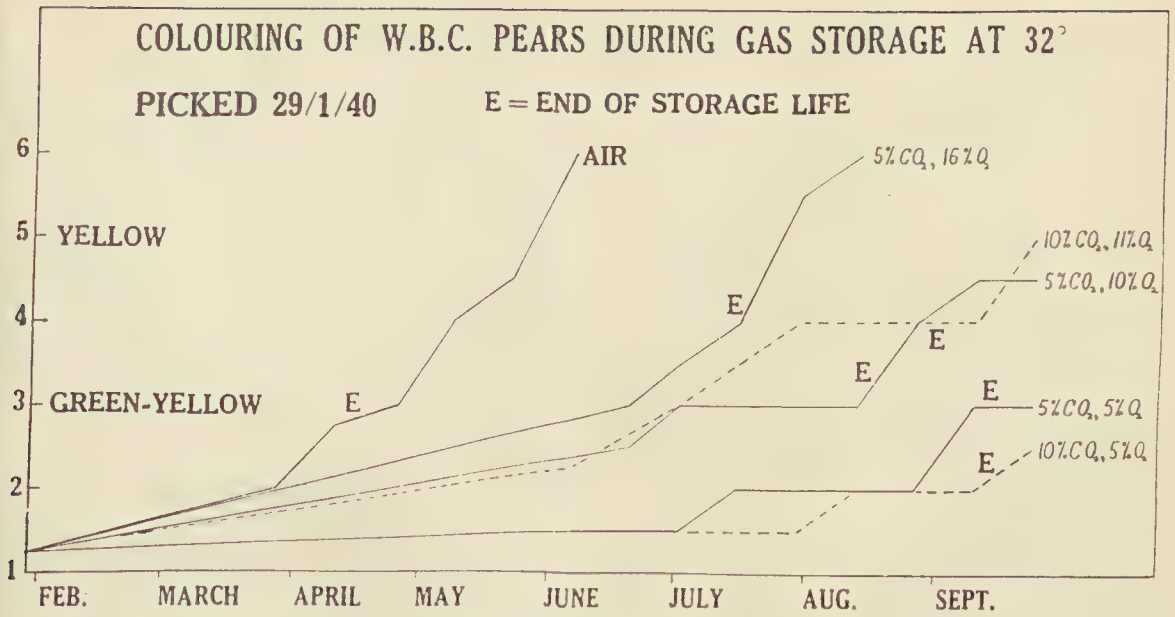


Fig. 4.

and 5. The results indicate that the rate of colouring is largely a function of the concentration of oxygen, whether the concentration of carbon dioxide is 5 per cent. or 10 per cent. An additional effect due to carbon dioxide could only be detected in the case of pears of the second picking (Fig. 5) stored in 5 per cent. CO_2, 5 per cent. O_2 and 10 per cent. CO_2, 5 per cent. O_2. In this case the higher concentration of carbon dioxide resulted in a further retardation of colouring. However, the storage life is not affected by oxygen concentration to nearly the same extent as rate of colouring, with the result that the colour at the end of the storage life varies according to the atmosphere of storage, and the pears stored in 5 per cent. CO_2, 5 per cent. O_2 and 10 per cent. CO_2, 5 per cent. O_2 are usually still comparatively green at the end of the storage life.

The effect of oxygen concentration on rate of colouring was similar for Packham and Josephine pears. In 5 per cent. CO_2, 5 per cent. O_2 and 10 per cent. CO_2, 5 per cent. O_2 colouring was considerably retarded, but the storage life was only slightly extended.

The relative development of colour (which in W.B.C. pears has been regarded as an index of senescence or progress to the end of the storage life) affords an explanation of the varying susceptibility to hard heart in the second picking of W.B.C. pears in 1940. Pears of this maturity stored in 10 per cent. CO_2, 11 per cent. O_2 at 32°F. were severely affected after four and a half months, while corresponding samples stored in 10 per cent. CO_2, 5 per cent. O_2 were entirely free from disorders after eight months' storage. From Fig. 2 it can be seen that the pears in 10 per cent. CO_2, 11 per cent. O_2 coloured much more rapidly, and probably reached the stage at which they became susceptible to injury comparatively early, while in 10 per cent. CO_2, 5 per cent. O_2 the development of susceptibility was considerably delayed.

Assuming that susceptibility to hard heart in W.B.C. pears is related to the degree of colour development, a suitable method of controlling this disorder and obtaining the maximum storage life would possibly be to store in 10 per cent. CO_2, 11 per cent. O_2 for the first three months, or until the pears had reached Colour 3, and then change the atmosphere to 5 per cent. CO_2, 16 per cent. O_2.

Gas Storage followed by Storage in Air

In 1939 W.B.C. pears were also stored for two and four months in gas storage at 32°F., and then stored in air at the same temperature. It was thought possible by this means to avoid gas injury and retain all the advantages of an increased storage life. Only two atmospheres 5 per cent. CO_2, 16 per cent. O_2 and 10 per cent. CO_2, 11 per cent. O_2, which

are obtainable by controlled ventilation, were used. The effect of these treatments on the storage life is shown in Table 2.

TABLE 2.—THE EFFECT OF GAS STORAGE FOLLOWED BY AIR STORAGE AT 32°F.

Storage Conditions.	Storage Life (Months).	
	Picked 19th January, 1939.	Picked 2nd February, 1939.
Air.	2¼ c.b.	2 c.b.
5 per cent. CO_2, 16 per cent. O_2 continuously	5 c.b.	4 c.b.
5 per cent. CO_2, 16 per cent. O_2 for two months, then air ..	3½ c.b.	3½ c.b.
5 per cent. CO_2, 16 per cent. O_2 for four months, then air ..	4½ c.b.	4 c.b.
10 per cent. CO_2, 11 per cent. O_2 continuously	6	5 h.b.
10 per cent. CO_2, 11 per cent. O_2 for two months, then air ..	3½ c.b.	3½ c.b.
10 per cent. CO_2, 11 per cent. O_2 for four months, then air ..	5 c.b.	5 c.b.

c.b. = storage life terminated by core breakdown.
h.b. = storage life terminated by hard heart.

The results show definitely that continuous gas storage is the only way to obtain the maximum storage life. When the pears were gas stored for the first two months only, the storage life was only increased by about a month compared with the storage life in air. Gas storage for four months was, of course, practically equivalent to continuous gas storage except in the case of the first picking stored in 10 per cent. CO_2, 11 per cent. O_2. In this case the storage life was five months compared with six months in continuous gas storage. In the case of the second picking stored in 10 per cent. CO_2, 11 per cent. O_2 the effect of limiting gas storage to four months only was to replace the final development of hard heart by an equal development of core breakdown after about the same period in storage.

Delayed Gas Storage

W.B.C., Packham, and Bosc pears have also been gas stored at 32°F. following initial periods in air. The results have clearly demonstrated that the advantages of gas storage are largely lost if there is an appreciable period of delay. In some experiments (particularly with the Bosc variety) the pears were seriously affected by hard heart after a comparatively short period, while similar pears which were gas stored within three to four days of picking remained free from disorders for twice the period. The result is probably due to the pears having coloured and become extremely susceptible to injury during the

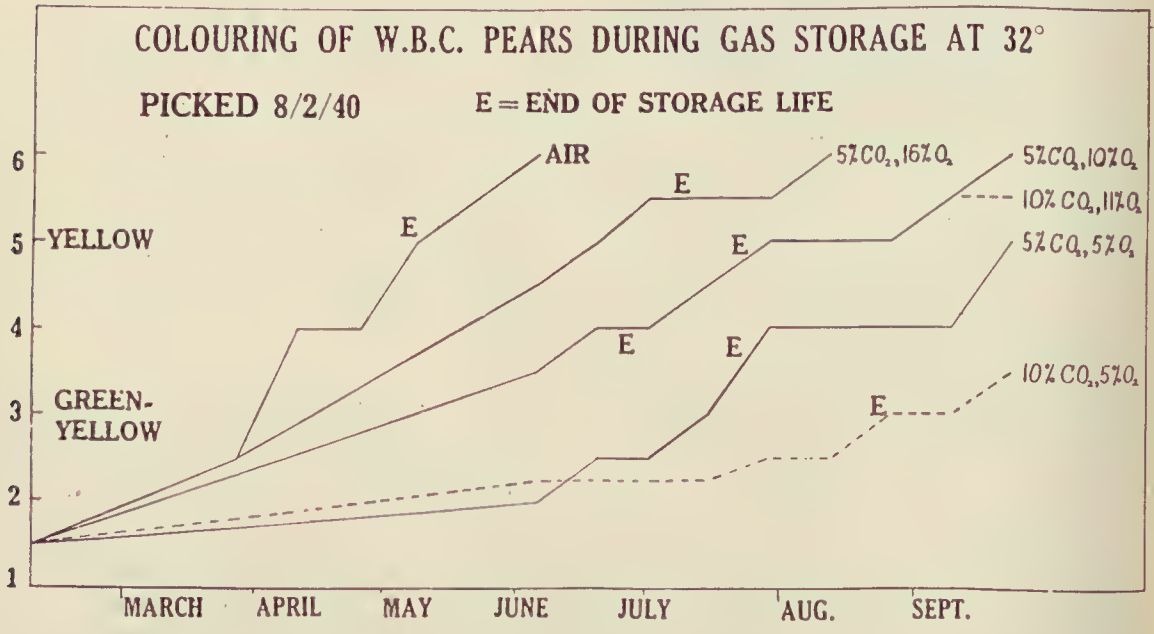


Fig. 5.

initial period of delay in air, while in continuous gas storage the onset of susceptibility was considerably delayed.

These experiments were undertaken in order to demonstrate the serious risk of allowing carbon dioxide to accumulate in storage, unless the appropriate concentration is obtained within a few days of picking and maintained at that level throughout the storage period. The risk of injury is particularly serious in overseas shipment, as many of the pears have been held back in local storage for some weeks before shipment, and the possibility of carbon dioxide accumulating is much greater in a ship's hold than in land storage.

In Table 3, results of experiments on the effect of delayed gas storage on the storage life are summarized.

In the case of the W.B.C. pears delayed in air for six weeks, the advantage of gas storage has been entirely lost, and severe injury has occurred in 10 per cent. CO_2, 11 per cent. O_2—lenticel scald in the first picking and hard heart in the second picking. During the period of delay pears of the first picking coloured only slightly, but those of the second picking coloured considerably (almost to pale-yellow).

In 1937 and 1939 all the gas stored Packham and Bosc pears were delayed in air for three weeks. In 1937 this was due to the pears having been held for three weeks in commercial storage before delivery. In 1939 these varieties were deliberately delayed until the later varieties were picked, as commercial application would be greatly simplified if most of the varieties could be stored together. This compromise, however, was not successful. The percentage increase in life due to gas storage was less than in other years, and gas injury (hard heart), which has not been serious in continuous gas storage, also developed in atmospheres containing 10 per cent. of carbon dioxide.

More detailed studies have been undertaken on the development of gas injury in Bosc pears which have been gas stored immediately after picking and also after various periods of delay. This variety has been particularly liable to wastage on the British market, and it was desirable to determine as precisely as possible the conditions governing the incidence of core breakdown and hard heart.

In the experiments to be described samples of about 50 pears were gas stored under conditions of reduced ventilation and examined in order to estimate the percentage of disorders. In giving the results of these and subsequent experiments, the atmospheres are described simply in terms of their carbon dioxide content, as the oxygen content is reduced below 21 per cent. to the same extent that the carbon dioxide content is increased.

The experiments were designed in the first place to determine the amount of injury likely to occur in seven to eight weeks, which is about the maximum period on shipboard. The results obtained in 1937, which have been already reported (2), indicated that in eight weeks appreciable injury only occurred when the concentration of carbon dioxide exceeded

TABLE 3.—THE EFFECT OF DELAYED GAS STORAGE ON W.B.C., PACKHAM, AND BOSC PEARS AT 32°F.

Variety.	Date of Picking.	Colour at Picking.	Period of delay in Air (Weeks).	Colour after Delay.	Storage Life (Months).					
					Air.	5 % CO_2* 16% O_2.	10 % CO_2* 11 % O_2.	5 % CO_2, 10 % O_2.	5 % CO_2, 5 % O_2.	10 % CO_2, 5 % O_2.
W.B.C.	19.1.39	1¼	0	..	2½ c.b.	5 c.b.	6	..	..	..
W.B.C.	19.1.39	1¼	6	1¾	2½ c.b.	2½ c.b.	2½ l.s.	..	..	..
W.B.C.	2.2.39	1¾	0	..	2 c.b.	4 c.b.	5 h.h.	..	..	..
W.B.C.	2.2.39	1¾	6	3½	2 c.b.	2 c.b.	2 h.h.	..	..	..
Packham	10.3.37	1½	3	..	5½	8	5½ h.h.	8	7	5½ h.h.
	3.3.39	1¾	3	..	8	9½	8½	..	..	..
Bosc	10.3.37	½	3	..	4	6	4 h.h.	6	6	6
	3.3.39	1¾	3	..	2	3	4	..	..	..

* Atmosphere obtained by reduced ventilation.
c.b. = Storage life terminated by core breakdown.
h.h. = Storage life terminated by hard heart.
l.s. = Storage life terminated by lenticel scald.

TABLE 4.—GAS STORAGE OF BOSC PEARS WITH AND WITHOUT PREVIOUS AIR STORAGE.

Examination after a further week in air at 60°F.

Previous Treatment.	Colour after Previous Treatment.	Conditions during Final Seven Weeks.	Wastage (per centage).			
			Scald and Core Breakdown.	Core Breakdown.	Hard Heart.	Total.
Nil	1¾	32° F. Air ..	0	0	0	0
		,, 5 per cent. CO_2	0	0	0	0
		,, 10 per cent. CO_2	0	0	0	0
		36° F. Air	0	0	0	0
		,, 5 per cent. CO_2	0	0	0	0
		,, 10 per cent. CO_2	0	0	0	0
32° F. 10 per cent. CO_2 7 weeks	2¼	32° F. 10 per cent. CO_2	0	0	0	0
32° F. 10 per cent. CO_2 14 weeks	2½	32° F. 10 per cent. CO_2	0	0	0	0
32° F. 5 per cent. CO_2 7 weeks	2½	32° F. 5 per cent. CO_2	0	0	0	0
32° F. 5 per cent. CO_2 14 weeks	2½	32° F. 5 per cent. CO_2	0	0	0	0
32° F. Air 7 weeks	3	32° F. Air	0	0	0	0
		,, 5 per cent. CO_2	0	0	0	0
		,, 10 per cent. CO_2	0	8	2	10
		36° F. Air	0	0	0	0
		,, 5 per cent. CO_2	0	2	0	2
		,, 10 per cent. CO_2	0	2	0	2
32° F. Air 14 weeks	4½	32° F. Air	0	0	0	0
		,, 5 per cent. CO_2	0	54	2	56
		,, 10 per cent. CO_2	0	12	88	100
		36° F. Air	4	0	0	4
		,, 5 per cent. CO_2	0	12	0	12
		,, 10 per cent. CO_2	0	56	42	98

10 per cent. This would give a considerable margin of safety, but it was considered desirable to test the effect of lower concentrations of carbon dioxide (5 per cent. CO_2 and 10 per cent. CO_2) in more detail before deciding the maximum allowable concentration.

In 1938 Bosc pears were promptly stored at 32°F. in air, 5 per cent. CO_2 and 10 per cent. CO_2. The storage period was eight weeks. All samples subsequently ripened at 65°F. without any disorders developing. However, another sample stored at 32°F. for fifteen weeks in air followed by eight weeks in 10 per cent. CO_2 developed 87 per cent. disorders (62 per cent. core breakdown and 25 per cent. hard heart). All this wastage was due to gas storage injury, as corresponding samples stored for 23 weeks in air ripened with poor quality but without disorders. (Referring to Table 1, we see that similar pears were kept for eight months in continuous gas storage without developing disorders.)

The factors determining core breakdown and hard heart were investigated more fully in 1939. Bosc pears were held both at 32°F. and 36°F. in air, 5 per cent. CO_2 and 10 per cent. CO_2, for seven weeks after (*a*) picking, (*b*) previous storage at 32°F. in air for seven weeks, (*c*) previous storage at 32°F. in air for fourteen weeks. The purpose of this experiment was to determine to what extent the effect of carbon dioxide during the final seven weeks (corresponding to the shipping period) was influenced by the period and conditions of storage before shipping.

Samples were also stored at 32°F. in 5 per cent. CO_2 and 10 per cent. CO_2 for the full period of 21 weeks for comparison with the pears kept in gas storage for the final seven weeks only. All samples were finally ripened at 60°F., and examined after one, two, and three weeks at this temperature.

The examination after one week at 60°F., when the pears were only half ripe, gave the

clearest information on gas injury, as practically all the core breakdown and hard heart, which was due in any way to the effect of carbon dioxide, had already developed, while scald and breakdown resulting from over-storage or over-ripeness had not yet made their appearance. The results of this examination are set out in Table 4 on the previous page.

The pears are entirely free from disorders after continuous air storage or continuous gas storage for as long as 21 weeks at 32°F. But if the pears have been previously stored in air disorders may develop seriously after only seven weeks' gas storage. If delayed in air for fourteen weeks they are readily injured even by 5 per cent. CO_2.

In Table 4 the treatments are grouped according to the stage of colour that the pears had reached before the final seven weeks' gas storage. The pears do not become liable to injury until they reach colour 3. At this colour they become liable to injury in 10 per cent. CO_2, but are unaffected by 5 per cent. CO_2 until they reach about colour 4. It would appear that the stage of senescence of the fruit is more important in determining injury than an unduly long exposure to gas storage. Seven weeks' exposure is quite enough to cause serious injury if the pears are sufficiently forward.

From studies of respiration, it appears that after the periods of delay in air the pears had not yet reached the climacteric. However, recent results have cast some doubt on the similarity of behaviour of isolated pears in respiration shells and pears stored in bulk.

The amount of wastage in the samples after two weeks at 60°F., when the pears were fully ripe, is given in Table 5.

The results of the second examination are similar to those of the first examination, except that the pears which had been in continuous air storage for 21 weeks developed a fair

TABLE 5.—GAS STORAGE OF BOSC PEARS WITH AND WITHOUT PREVIOUS AIR STORAGE.

Examination after a further two weeks in air at 60°F.

Previous Treatment.	Colour after Previous Treatment.	Conditions during Final Seven Weeks.	Wastage (per centage).					
			Scald.	Scald and Core Breakdown.	Scald and Hard Heart.	Core Breakdown.	Hard Heart.	Total.
Nil	1¾	32° F. Air	0	0	0	0	0	0
		„ 5 per cent. CO_2	0	0	0	0	0	0
		„ 10 per cent. CO_2	0	0	0	0	0	0
		36° F. Air	0	0	0	0	0	0
		„ 5 per cent. CO_2	0	0	0	0	0	0
		„ 10 per cent. CO_2	0	0	0	0	0	0
32° F. 10 per cent CO_2 7 weeks	2¼	32° F. 10 per cent. CO_2	0	0	0	0	0	0
32° F. 10 per cent. CO_2 14 weeks	2½	32° F. 10 per cent. CO_2	0	0	0	0	0	0
32° F. 5 per cent. CO_2 7 weeks	2½	32° F. 5 per cent. CO_2	0	0	0	2	0	2
32° F. 5 per cent. CO_2 14 weeks	2½	32° F. 5 per cent. CO_2	0	0	0	5	0	5
32° F. Air 7 weeks	3	32° F. Air	0	0	0	0	0	0
		„ 5 per cent. CO_2	0	0	0	2	0	2
		„ 10 per cent. CO_2	0	0	0	9	0	9
		36° F. Air	0	14	0	2	0	16
		„ 5 per cent. CO_2	0	2	0	2	0	4
		„ 10 per cent. CO_2	0	0	0	4	0	4
32° F. Air 14 weeks ..	4½	32° F. Air	15	7	0	2	0	24
		„ 5 per cent. CO_2	3	22	2	36	0	63
		„ 10 per cent. CO_2	0	0	7	13	79	99
		36° F. Air	15	48	0	2	0	65
		„ 5 per cent. CO_2	0	6	0	40	0	46
		„ 10 per cent. CO_2	0	2	6	50	39	97

TABLE 6.—EFFECT OF HIGH CONCENTRATIONS OF CARBON DIOXIDE FOR A SHORT PERIOD.

Examinations after a further week in air at 60°F.

Preliminary Treatment.	Colour after Preliminary Treatment.	Final Treatment.	Wastage (per centage).		
			Core Breakdown.	Hard Heart.	Total.
32° F. Air 7 weeks	3	32° F. Air 7 weeks	0	0	0
		„ 5 per cent. CO_2 7 weeks	0	0	0
		„ 10 per cent. CO_2 7 weeks	8	2	10
32° F. Air 7 weeks + 45°–37° F. 20–13 per cent. CO_2 6 days	3	32° F. Air 6 weeks	0	0	0
		„ 5 per cent. CO_2 6 weeks	0	0	0
		„ 10 per cent. CO_2 6 weeks	8	0	8
32° F. Air 7 weeks + 45°–37° F. 10 per cent. CO_2 6 days	3 ..	32° F. Air 6 weeks	0	0	0
		„ 5 per cent. CO_2 6 weeks	0	0	0
		„ 10 per cent. CO_2 6 weeks	12	0	12
32° F. Air 7 weeks + 45°–37° F. Air 6 days	3½	32° F. Air 6 weeks	0	0	0
		„ 5 per cent. CO_2 6 weeks	0	0	0
		„ 10 per cent. CO_2 6 weeks	28	4	32

amount of scald and breakdown after a further two weeks at 60°F., while the pears kept in 10 per cent. CO_2 continuously remained entirely free from disorders. The superiority of continuous gas storage is demonstrated strikingly at the second examination, as both carbon dioxide injury and the disorders of over-storage are avoided.

A further examination was made after three weeks at 60°F. Every sample was then showing signs of over-ripeness, particularly the air stored samples. The pears stored in 10 per cent. CO_2 continuously were in by far the best condition, as only about 10 per cent. had core breakdown. The pears from the other treatments were almost completely wasty.

Short Exposure to High Concentrations of Carbon Dioxide

The rate of production of carbon dioxide by pears at 32°F. is very low, and the possibility of the gas accumulating in ships' holds to appreciable concentrations at this temperature is correspondingly slight. But if the pears were loaded warm and took several days to cool, their respiration would be considerably greater, and the carbon dioxide might possibly attain initial concentrations of even 20 per cent. in badly-ventilated holds. It was desirable to determine whether exposure to high concentrations of carbon dioxide for a short period at somewhat higher temperatures would be more likely to cause injury than exposure to lower concentrations for several weeks at 32°F. In order to simulate such conditions, Bosc pears (already stored for seven weeks in air at 32°F. and hence more sensitive to injury) were kept at temperatures which gradually fell from 45°F. to 37°F. in six days. Some samples were kept in air, others in 10 per cent. CO_2, and others in an atmosphere whose carbon dioxide content was gradually reduced from 20 per cent. to 13 per cent. in six days. Samples from each of these preliminary treatments were then stored for a further six weeks at 32°F. in air, 5 per cent. CO_2 and 10 per cent. CO_2.

The amount of carbon dioxide injury resulting from these treatments, as shown by examination after one week at 60°F., is given in Table 6.

It is apparent that the initial exposure to carbon dioxide, even in concentrations as high as 20 per cent., has not been injurious, as no trouble developed when the pears were subsequently stored in air. With regard to the influence of the preliminary treatments on susceptibility to gas injury during the final six weeks at 32°F., the few days in air at the higher temperature made the pears definitely more forward and more susceptible to subsequent injury in 10 per cent. CO_2. The wastage in 10 per cent. CO_2 was increased from 10 per cent. to 32 per cent. as a result of the preliminary treatment in air at the higher temperature.

The initial exposure to carbon dioxide at the higher temperature has actually been beneficial in this instance, as it has prevented the pears from becoming more forward and hence more susceptible to subsequent gas injury.

Discussion

The authors' experiments have shown that gas storage only increases the storage life of pears under certain definite conditions, and should only be attempted commercially under rigorous control.

With regard to the gas storage of W.B.C. pears for canning, there is no immediate demand for a method of holding the fruit for longer than four months at the most, and gas storage in 5 per cent. CO_2, 16 per cent. O_2, would be quite adequate for this purpose. If the industry expanded sufficiently to require a longer storage period, gas storage in 10 per cent. CO_2, 11 per cent. O_2 for about three months and then in 5 per cent. CO_2, 16 per cent. O_2 is suggested provisionally, but further work is in progress to test this method of storage.

It has been pointed out that W.B.C. pears picked at the beginning of the commercial period have a somewhat longer storage life, and are less liable to gas injury than those picked later. Hence canners proposing to adopt this method of storage would be well advised to consider the practicability of gas-storing the earlier picked pears, and hold them until the later picking had been canned.

For local marketing, gas storage would make possible the holding of Bosc pears until August and Winter Cole pears until December. The storage life of other varieties has hardly been extended sufficiently for commercial application, and it is questionable whether it would be an economic proposition to provide gas storage equipment for these varieties alone. Extension of the storage life of Bosc pears would merely bring them into competition with longer-keeping varieties. Winter Cole pears could well be kept longer, but are at present only grown to a minor extent.

The use of gas storage for export pears is hardly a practical question at present. It need only be pointed out that with the export season terminating in August (as was the case before the war) an appreciable reduction in wastage would not be expected even under ideal conditions, but there might be some improvement in quality. Gas storage before shipping involves numerous practical difficulties, particularly the necessity of frequently opening the store for receiving and shipping fruit. Gas storage conditions in the hold are to be avoided if the fruit has been held in ordinary (air) cool storage for more than a month before shipping.

How to make a Chamber Gastight

In Great Britain, where gas storage was first introduced, a large proportion of the chambers used for this purpose have wooden walls and ceiling and a concrete floor. To make a chamber gas-tight, the walls and ceiling have usually been lined with sheet metal pre-treated with a gas-proof coating. The sheets overlap, and the join is filled in with gas-proof material. Originally, vaseline was used as the gas-proof coating, but proprietary bitumen preparations, such as bitumastic paint, which give a firm smooth surface, are now largely used.

The floor was originally smeared with grease, but solid bitumen is a far more suitable coating, as it is permanent and can be cleaned.

Where both the walls and floor are of concrete, coating the entire surface with suitable gas-proof material (instead of using sheet metal) calls for consideration. This method has been adopted in a Victorian cannery, and the required degree of gas-tightness was achieved. Ordinary bitumastic paint was not found satisfactory, and "Flintkote," a proprietary bitumen emulsion, was finally adopted.

The application of bitumen coatings direct to wooden walls and ceiling is at present entirely a matter of experiment, and is likely to be rather difficult with the irregular surface formed by tongue and groove boards, such as are common in Victorian cool stores. Any warping of the wooden framework might cause cracks in the coating, and it would probably be better, if not too costly, to strengthen the surface first with the sheet metal.

Summary

Six varieties of Victorian pears have been gas stored at 32°F., and their storage life was definitely increased in most cases.

Continuous gas storage in 5 per cent. carbon dioxide, 16 per cent. oxygen has increased the storage life of W.B.C., Bosc, and Winter Cole years by about 100 per cent.; Packham and Winter Nelis pears by about 30 per cent.; and Josephine pears by less than 10 per cent.

Gas storage in 10 per cent. CO_2, 11 per cent. O_2 has sometimes extended the life even further, but there is serious risk of gas injury (hard heart). It would be better to change to 5 per cent. CO_2, 16 per cent. O_2 after an initial period in 10 per cent. CO_2, 11 per cent. O_2.

The atmospheres 5 per cent. CO_2, 10 per cent. O_2; 5 per cent. CO_2, 5 per cent. O_2; and 10 per cent. CO_2, 5 per cent. O_2, which involve more specialized technique, have not given any better results on the average, and their use is hardly justified.

Continuous gas storage has given much better results than gas storage followed by air storage, or vice versa. In fact, initial storage in air has actually rendered the pears far more liable to injury in subsequent gas storage. This is particularly true of Bosc pears, which cannot stand even 5 per cent. carbon dioxide after about three months in air.

No evidence of injury has been obtained when Bosc pears are subjected to high concentrations of carbon dioxide (20 per cent. falling to 13 per cent.) for about a week during the storage period.

The response of W.B.C. pears to gas storage has varied considerably with picking date. The second picking has been much more liable to gas injury (hard heart) in 10 per cent. CO_2, 11 per cent. O_2 than the first picking, which was made only ten to fourteen days earlier.

Retardation of colouring in gas storage is largely a function of the concentration of oxygen.

References.

1. Kidd, F., and West, C.—*Food Investigation Board Special Report, No.* 12, 1923.
2. Tindale, G. B., Trout, S. A., and Huelin, F. E.—*Journal of Agriculture of Victoria*, 1938, 36, 34, and 90.

POTATO MANURIAL TRIALS—*continued from page 577.*

does not practice field selection. This latter seed proved to be 90 per cent. virus infected, as against 7 per cent. in the crop from certified seed.

Variety Tests.

The variety tests were conducted under similar soil and manurial conditions. The list included several varieties new to Victoria that were imported from Great Britain and America by the Department of Agriculture several years ago.

Variety Tests.

Variety.	Yield.	Variety.	Yield.
	T. C.		T. C.
Snowflake ..	4 18	Pink Eye (N.Z.)	3 14
Late Carman ..	5 10	Awan Consul ..	1 15
Up-to-Date ..	3 18	Kerr's Pink ..	3 15
Brownell ..	1 10	Arran Cairn ..	4 8
Katahdin ..	2 9	Arran Banner ..	1 8
Delaware ..	2 6	Arran Peak ..	1 9
Sebago ..	4 1	Redskin ..	2 8
Duke of Kent	1 15	Ballydoon ..	2 4
Ben Lomond ..	1 1	Doon Early ..	2 6
Glen Clova ..	1 5	Dunbar Rover ..	1 1

LIVE STOCK NOTES—*continued from page 588.*

They obtain their nourishment by inserting the proboscis through a pore of the skin and sucking up blood. This causes intense irritation to the sheep.

The mature female lays eggs each of which contains a fully developed larva. At first the egg is white, but in a few days it tends to shrivel and turns a dark-brown colour, and after 19 to 25 days a fully-formed tick emerges. These ticks reach maturity in about four days, and about fourteen days later the female lays eggs, and so completes the life cycle.

Ticks are spread usually from one live sheep to another, but sheep also may become infested by being placed in sheds or yards where infested sheep have recently been kept.

Sheep owners requiring information on dipping should apply to the Department of Agriculture, Melbourne, for a copy of the free pamphlet "Sheep Dipping."

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69
Banyule Stud Pty. Ltd.	Wangaratta ..	42
Black, I. S., Estate ..	Mount Noorat ..	52
Clarke, A. B. ..	Glenormiston South	16
Dennis, Mrs. A. A. ..	Frankston	33
Dookie Agricultural College	Dookie	77
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18
Geelong Grammar School	Corio	56
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29
Gorman, A. W. ..	"Cathcart," Alexandra	61
Holloway, R. W. ..	Caldermeade ..	72
Kilmany Park Farm Home for Boys	Sale	94
Lawrence, P. H. ..	"Rainga," Tarrawarra	72
Longerenong Agricultural College	Dooen	43
McNabb and Son, G. A.	Irrewillipe East ..	177
Onley, W. H. ..	"Glenholme," Caldermeade	50
Payne, A. E. T. ..	"Yarra View," Lilydale	63
Payne, T. E. N. ..	"Woodburn," Kilmore	46
Powell, T. S. ..	"Carellen," Mansfield	46
Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	30
Samuel, Misses G. and E.	Lang Lang ..	48
School of Horticulture	Burnley	9
State Experiment Farm	Rutherglen ..	40
State Research Farm	Werribee	229
Wells, W. G. ..	Caldermeade ..	65

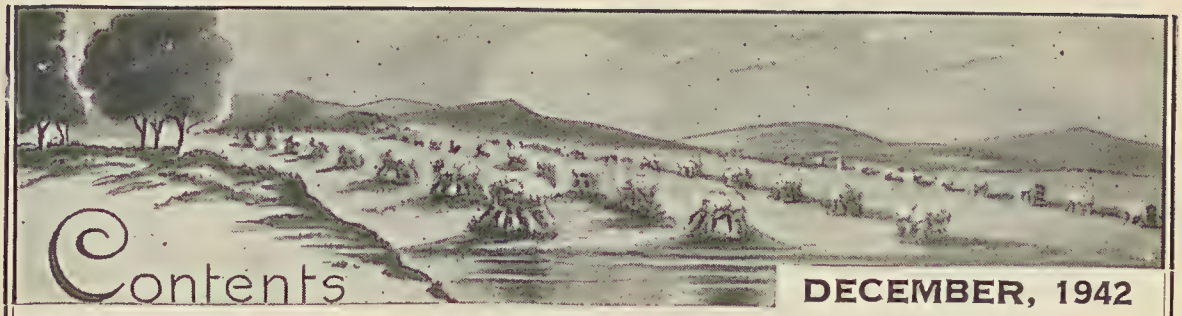
In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43
Andrew, J. C. ..	Whittlesea ..	121
Andrew, W. ..	Whittlesea ..	160
Andrews, E. H. ..	Templestowe ..	19
Balharrie, J. A. ..	Whittlesea North ..	59
Barclay, A. H. ..	Whittlesea ..	107
Barling, J. ..	Mernda	39
Batten, R. J. ..	Wollert	44
Bebbington, J. ..	Whittlesea ..	92
Benson, R. ..	South Morang ..	28
Bodycoat, A. ..	Wollert	39
Booth, Mrs. A. ..	Warrandyte ..	8
Bourke, G. J. ..	Fairfield	82
Bradbury, A. K. ..	Diamond Creek ..	31
Buckley, F. J. ..	Mernda	104
Bunting, J. ..	Epping	35
Butler, W. ..	Wallan	49
Callaghan, L. ..	Epping	34
Callaghan, T. F. ..	Thomastown ..	40
Carr, W. J. ..	Wollert	65
Child, G. P. ..	Epping	53
Christian Bros. ..	Doreen	41
Clark, P. W. ..	Whittlesea ..	62
Clements, M. and L., and Son	Bundoora	135
Cobain, J.	Thomastown ..	40
Collins, L.	Doreen	74
Cornfoot, D. H. ..	Whittlesea ..	25
Cotchin, J. ..	Woodstock ..	18
Coulthard, J. J. ..	Whittlesea ..	66
Craker, Mrs. E. ..	Warrandyte ..	2
Cumming, H. R. ..	South Morang ..	20
Cunningham, E. C. ..	Templestowe ..	23
Danaher, J. V. ..	Whittlesea ..	63
Danns, N. C. ..	Whittlesea ..	34
Dennett, C. A. ..	Cragieburn ..	38
Deutscher, H. W. ..	Mernda	168
Deveny, M. ..	Bundoora	51
Draper, L. S. ..	Wollert	31

TUBERCLE-FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Drysdale, J. C.	Warrandyte	41	Miller Bros.	Greensborough	36
Evans, Miss M.	Bundoora	29	Mosig, H. C.	Epping	26
Fellows Bros.	West Heidelberg	52	Nalder, H. S.	Epping	20
Fergusson, M. A.	Whittlesea	92	Nash, H. A.	Tullamarine	41
Fitzsimons, B.	Lower Templestowe	33	Nebel, Mrs. A. E.	Thomastown	38
Fox, A.	Mernda	59	Norton, O. G.	Bundoora	37
French, T. W.	Wollert	43	O'Hern, T.	Epping	58
French, W.	Greenvale	51	O'Loughlin, W. L.	Epping	27
Gamble Bros.	Greenvale	156	Parker, Mrs. A. E.	Greensborough	24
Gallus, E. A.	Doncaster	11	Patullo, F. E.	Mickleham	36
Gardiner, C. E.	Epping	20	Pettit, W. H.	Thomastown	36
Gibbs, C.	Arthur's Creek	28	Pitson, R H.	Yarrambat	17
Goodman, A. E.	Broadmeadows East	55	Power, L. J.	Mernda	52
Graff, Mrs. M. G.	Mernda	24	Quinlan Bros.	Epping	49
Graham Bros.	Whittlesea	71	Raper, L. R.	Greensborough	36
Green, W.	Mernda	11	Rawlings, J. H.	Whittlesea North	41
Hall, J. E., Mrs.	Whittlesea North	13	Righetti, L. A.	Lower Templestowe	40
Hancorne, Miss M. R.	Yan Yean	27	Robson, Mrs. G. A.	South Morang	47
Harding, J. E.	Templestowe	42	Rodgers, E.	Whittlesea North	11
Hargreave, Mrs. E. J.	Whittlesea	21	Rosewarne, Miss P.	Yan Yean	43
Harkness, H. J.	South Morang	31	Seeber, B.	Thomastown	24
Harmer, R. E.	Wollert	38	Shanks, John	Mernda	73
Hawkes, Miss D.	Warrandyte	19	Sheeky, A. A.	Templestowe	14
Hehr, H.	Epping	32	Short, E.	East Preston	99
Hehr, R.	Wollert	23	Siebel, F.	Thomastown	26
Henshaw, Miss A.	Templestowe	16	Simpson, W. G.	Donnybrook	12
Herd, J.	Epping	46	Skals, P.	Rosanna	28
Hewitt, C. J.	Wattle Glen	8	Smirfitt, J. E.	Epping	39
Higgs, R. N.	Yan Yean	76	Smith, G. A.	Templestowe	63
Hobbs, Mrs. F. J.	Doncaster East	6	Smith, J. R.	Mernda	34
Hobbs Bros.	Heidelberg	65	Smith, L. McA.	Yan Yean	2
Howden, A.	Epping	29	Smith, L. W.	Bundoora	73
Howell, G. G.	Wollert	221	Smith, P. A.	Ivanhoe	2
Hughes, J.	South Morang	1	Smith, R. A.	Epping	26
Hussey, Mrs. S.	Warrandyte	1	Smith, S. E.	Epping	31
Jackson, Mrs. M. A.	Heidelberg	7	Southon, H. W.	South Morang	27
Jenkins, T. H.	Whittlesea	24	Stephens, H.	Epping	48
Johnstone, J. A., Miss	Mernda	14	Stimson, T.	Woodstock	33
Jones, A. J.	South Morang	30	Tarry, J.	South Morang	24
Jukes, C.	Epping	39	Thomas, Mrs. E.	Broadmeadows	11
Jukes, W. H.	South Morang	35	Thomas, W. C.	Yan Yean	31
Junor, G. M.	South Morang	37	Towt, C. W.	Glenvale	136
Kell, W. E.	Greensborough	21	Trethowan, F. W.	Donnybrook	94
Lay, P.	Alphington	30	Trist, H. P.	Greensborough	8
Loft, A. H.	Wollert	52	Troutbeck, H. R.	Mickleham	47
Lynch, D.	Donnybrook	44	Vallence, C. A.	Epping	11
McCormack, D.	Woodstock	33	Van, E. L.	Templestowe	28
McDonald, A. J.	Whittlesea	2	Walsh, J. B.	Templestowe	11
McDowell, R. H.	Greensborough	28	Whelpton, B.	Whittlesea North	59
McGregor, W. B.	Mernda	41	White, W.	Greensborough	18
McKay, J. M.	Coburg	62	Whittingham, E. W.	Greensborough	41
McKay, L.	Kal Kallo	12	Williams, E. A.	Thomastown	33
McKendry, J.	Doreen	47	Williamson, J.	Doncaster (High-street)	5
McKernan, A. H.	Whittlesea	24	Willis Bros.	Craigieburn	61
McKie, J. W.	Wollert	83	Wilson, J. E.	Diamond Creek	35
McLean, J. F.	Bundoora	32	Wilson, Mrs. M.	South Morang	14
McPhee, K.	Whittlesea	116	Wood, A. V.	Yan Yean	125
McPherson, A.	Yan Yean	64	Wrest, W.	Epping	77
Mason, N.	Donnybrook	52	Wuchatsch, J. D.	Epping	14
May, Mrs. M.	Warrandyte	5	Yann, R.	Wollert	52
Mays, Mrs. A. M.	Doncaster	5	Young, Mrs. A.	Wollert	33
Merriman, J.	Diamond Creek	17	Ziebell, H.	Thomastown	32
Miller, A. J.	Whittlesea North	47			

There are also 351 herds in which 9,743 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.



Contents

DECEMBER, 1942

		PAGE
Maintain Meat Production—Sheep in the Wheat belt	*W. B. Miller, M.Agr.Sc., and N. A. Bowman*	609
Registration of Vegetable Seed Crops		616
Accredited Brucellosis-free Herds (Swine)		616
Potato Growing Campaign		617
Pullorum Tested Flocks (Poultry)		618
Wind Erosion	*H. Hanslow, and H. L. Hore, B.Agr.Sc.*	619
Parasites of Cattle		623
Sheath Rot in Sheep		632
Pig Raising in Wheat Areas	*L. A. Downey, H.D.A.*	633
Plant Diseases—		
Peach Rust		635
Peach Leaf Curl		636
Blossom End Rot of Tomatoes		637
Insect Pests—		
The Tomato Moth		637
House Ant		638
Argentine Ant		638
Mound or Meat Ant		639
Live Stock Notes	*Compiled by A. C. T. Hewitt, M.Agr.Sc.*	640
Garden Notes	*J. L. Provan, B.Agr.Sc.*	644
Orchard Notes	*G. W. Gayford, B.Agr.Sc.*	646
Jam Making		647
Tubercle-free Herds (Dairy Cattle)		659
Standard Herd Records—For Quarter ended 30th September, 1942		652

Issued by direction of the Hon. E. J. Hogan, M.L.A., Minister of Agriculture.

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES

The articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided both the Journal and author are acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence. Subscriptions should be forwarded to the Director of Agriculture, Melbourne, C.2.

POSTAGE RATES

The postage required for this issue is :—To Australia and New Zealand, 1½d. ; to United Kingdom, 2½d. ; to United Kingdom via All-sea route, 1½d. ; to other British Possessions, 2½d. ; to U.S.A. and Foreign Countries, 3½d.

FARM HOUSING SHORTAGE

solved by the new

JHARCO CABINS

The latest development in the use of Hardie's Fibrolite Asbestos Cement materials is the new Jharco Cabin. Its construction eliminates all unnecessary timbering by the use of three curved self-supporting corrugated Fibrolite Sheets bolted at the joints. As illustrated these cabins are ideal for the housing of land-army workers as well as providing additional simple and economical farm buildings.

HARDIE'S GENUINE FIBROLITE

ASBESTOS CEMENT BUILDING MATERIALS

INDEX TO ADVERTISEMENTS

FRONT SECTION

Australian Barley Board (Barley Prices) v

Gippsland & Northern Co-operative Co. Ltd. (Seeds, &c.) vi

Hardie, James & Co. Pty. Ltd. ii

H. V. McKay Massey Harris Pty. Ltd. ... iii

Imperial Stock Food Products v

International Harvester Coy. of Australia Pty. Ltd. iv

Law Somner Pty. Ltd. (Seeds) ... opp. p. 628

Leggo, Victor, & Farmers Ltd. ... inside cover

Shell Co. of Australia Ltd. ... opp. p. 629

BACK SECTION

Australian Cement Ltd. ... ... inside cover

Blyth Chemicals Ltd. vi

Cockbill, J. vi

Commonwealth Serum Laboratories outside cover

Elder Smith & Co. Ltd. (Esa Bluestone) ... vi

General Motors-Holden's Pty. Ltd. ... opp. p. 645

Lane's Motors Pty. Ltd. (Allis-Chalmers Tractors) ... ... opp. p. 644

Rylands Bros. (Aust.) Pty. Ltd. viii

State Savings Bank ix

Trewhella Bros. Pty. Ltd. x

Victorian Railways ix

W. D. & H. O. Wills (Aust.) Ltd. (Havelock Tobacco) vii

Maintain Meat Production

Sheep in the Wheat Belt

By W. B. MILLER, M.Agr.Sc., Senior Inspector of Agriculture,
and N. A. BOWMAN, Sheep and Wool Expert

On the present outlook of the war, it is desirable that mutton and lamb production in Victoria should be maintained to meet the requirements of the armed forces, civilian population, and expected demands for export to Great Britain and elsewhere. At the same time, maximum production of beef and pig meats is essential.

It may be difficult to achieve these objectives on the reduced pasturage next year following the drastic rationing of superphosphate, and also because of difficulties associated with shortage of manpower and transport facilities affecting the care and marketing of stock, supplementary feeding in lean periods, control of disease, maintenance of water supplies and fences, &c.

Graziers and sheep farmers are urged to maintain, if possible, their usual percentage of lambing ewes within their flocks, but overstocking should be avoided.

The area of wheat and barley to be sown next year is expected to show a reduction of at least 1,000,000 acres below normal and the area fallowed will be reduced correspondingly. The cereal areas therefore will be able to carry more sheep, at least until the beneficial effects that cultivation of the land has on the subsequent feed, has disappeared. The sowing of oats for grazing will increase the carrying capacity of the wheat farm.

The maximum number of ewes consistent with reasonably safe stocking should be mated this season. These are available and in good condition for mating immediately. For fat lamb production rams of suitable British breeds should be chosen, as their use will result in the production of greater quantities of lamb and mutton than would be obtained by the use of the recognized wool-growing breeds. In addition, the ewe progeny, if not marketed as fat lambs, are potential breeders of future lambs for use in the wetter areas. The supply of such ewes may be short in the future.

Ewes should not be allowed to lose too much condition in the late summer and autumn. Hay and grain grown on the farm should be reserved for supplementary feeding.

THE Australian Agricultural Council, after consideration of the requirements and goals set down by the Australian Food Council, expects to obtain from Victoria and the border districts whose stock are marketed through this State, as much meat in 1942-43 as is normally produced.

The Victorian goal for meat in 1942-43 is 277,000 tons, comprising beef, veal, pig meats, mutton, and lamb in the quantities shown in the following table. Normal production of these meats is shown also, taken as the average of the three years 1936-37, 1937-38, and 1938-39.

MEAT PRODUCTION—VICTORIA.

—	Normal Production.	Production Goal.
	tons.	tons.
Beef and Veal	125,525	107,000
Pig Meats..	20,923	20,000
Mutton and Lamb ..	137,600	150,000

Although greater supplies of beef and pig meats were desired, it was considered that the goals decided upon were those attainable this season without depletion of the breeding stock.

The goals include the requirements for the armed forces in Australia and abroad, for the civilian population, and for export. Local consumption has increased enormously this year, and it is impossible therefore, for export to be maintained at the level of the first year of the war. The population of Great Britain is severely rationed in regard to meat owing to the shipping position, but would expect Australia to have supplies available to fill all the ships which can be spared for the purpose.

Much of the meat included in the above figures will be canned and dehydrated to cope with the difficult transport and storage problems created by the war.

Owing to the very favorable season and the high sheep population this year, it should be possible to reach the goals set for Victoria for 1942-43. If more is required, mutton can be obtained without drawing too heavily on the

stock, and the recently created Australian Meat Industry Commission will implement the plans in detail. Current prices should be a strong incentive to the producer who is in a position to respond to the appeal for maintenance of meat production.

The Federal Government has indicated that the producer will be paid adequately for his stock, and the recently created Australian Meat Industry Commission will implement the plans in detail. Current prices should be a strong incentive to the producer who is in a position to respond to the appeal for maintenance of meat production.

Factors Affecting Future Production

There is no information on hand to indicate that the requirements for 1943-44 will be less than those of this year. The progress of the war and its uncertain effects have already shown that it is almost impossible to forecast food production requirements, but at present there seems to be no prospect of a surplus of meat in Australia unless the shipping position deteriorates to such an extent that little space is available for export.

More beef and pig meats are desired, but for reasons of both time and manpower it will be difficult to materially increase production except in the most favorable of seasons. In Victoria approximately half of the beef consumed comes from the dairying industry which itself will have difficulty in meeting requirements. It is essential therefore that mutton and lamb production be maintained, but it should not be increased at the expense of dairy and beef production.

At the commencement of 1942, Victoria had a record sheep population of 20,598,000, of which 9,390,000 were ewes mated to produce lambs, many of which have now been marketed. The border districts, including the Riverina, were well stocked also.

The feed and water position is good, so that sheep should enter 1943 in splendid condition.

There are, however, two important factors due to the war which undoubtedly will reduce the production of meat in Victoria. They are:—

1. The enforced rationing of superphosphate, with the aid of which Victoria has so markedly increased its production during the past twenty years.
2. Manpower difficulties.

Superphosphate Rationing.

Superphosphate supplies for 1942-43 are less than half those used in Australia before

the war. When priority crops, such as vegetables, flax, &c., are supplied, the ration available for top-dressing of pastures will probably be less than 40 per cent. of the quantity used in 1939-40, while the quality of the superphosphate is lower than previously, a reduction in the phosphoric content of the fertilizer from 22 per cent. to 18 per cent. having been found necessary. The actual fertilizing value of the ration available for pastures in the coming year is only about one-quarter of that used before the war. Whether the position of superphosphate supplies will deteriorate still further depends largely on shipping, but it seems unlikely that there will be any improvement for some time.

Statistics showing the tremendous increase in the number of stock carried in Victoria following the general adoption of top-dressing pastures with superphosphate are given in the following table. The quantity of superphosphate used each year on pastures and crops is given also, together with the production of butter and numbers of sheep.

VICTORIA.—SUPERPHOSPHATE USED COMPARED WITH STOCK AND PRODUCTION SHOWN IN FIVE-YEARLY PERIODS FROM 1920 TO 1939 AND ALSO IN 1940.

Average Five Years.	Superphosphate Used.		Stock and Produce.		
	On Crops.	On Pastures.	Dairy Cows.*	Butter.†	Sheep.*
	tons.	tons.		1,000 lb.	
1920–24	142,000	15,000	726,000	84,000	11,990,000
1925–29	181,000	43,000	652,000	86,000	15,630,000
1930–34	133,000	66,000	839,000	134,000	16,870,000
1935–39	150,000	165,000	943,000	156,000	17,849,000
1940	151,000	172,000	942,000	156,000	20,400,000

* At 1st March following. † To 30th June following.

Each year, about 4,600,000 fat lambs not indicated in the above statistics are marketed. The export of lambs from Victoria and the border districts has trebled since 1920, the normal number now being 3,000,000. In addition at least some 1,600,000 are consumed locally. It is estimated that at least two-thirds of the fat lambs produced in Victoria are raised on pastures grown on land which regularly, though not annually, receives superphosphate, either as a direct top-dressing or with a cereal crop.

During 1942 and 1943 less than half the normal quantity of superphosphate will be distributed and only another most favorable season can prevent a sharp fall in the production of butter, beef, mutton, and lamb. If 1943 is a normal year only then the shortage of fertilizer will be severely felt and farmers and graziers will be forced to reduce their flocks and herds. This marketing of breeding stock may offset temporarily the fall in actual production, but the consequences in later years would be serious.

Manpower.

The reduced manpower available in the country to care for stock will soon be reflected in lower production. At the moment this factor is largely masked by the beneficial effects of the good season. Manpower is not available to satisfactorily care for breeding stock, treat for disease control, hand feed when necessary, attend to irrigation, water supply, fences, weed eradication and scores of other jobs which are necessary for the maintenance of stock numbers. It is already evident that conservation of fodder will be reduced owing to lack of manpower. This is a serious matter in any season, but particularly if a dry year should intervene.

Individual, co-operative and organized efforts are, and will be increased, but manpower problems must inevitably reduce production.

It is obvious, for the above reasons, that meat production at its present level in Victoria cannot be maintained except in the most favourable of seasons, but pasturage on areas formerly used mainly for wool and cereal grain purposes could be diverted towards meat production as a primary objective. Important as wool, wheat and barley may be, there is little chance of these products being under-supplied in relation to the requirements of the Allied Nations for the war, whereas the meat position is much less secure.

Distribution of Sheep in Victoria

The sheep areas of Victoria may be roughly classified as predominantly wool and mutton, or fat lamb and wool areas, according to the mating of the ewes with either of the following groups of rams:—

(*a*) *Wool and Mutton*:—Merino, Polwarth Corriedale.

(*b*) *Fat Lamb, Mutton and Wool*:—Rams of British Breeds, viz.: Border Leicester, Southdown, Dorset Horn, Romney Marsh, English Leicester, Ryeland, Shropshire, Lincoln, and Suffolk.

It is appreciated that Merino and Polwarth lambs sometimes may be sold as fat lambs, and that the Corriedale breed used with suitable ewes produces good lambs, but in the main the classification is considered valid.

Fat lambs from the Mallee, bred from Merino ewes mated to Dorset Horn rams.

Border Leicester Cross lambs bred from Merino ewes.

The distribution of ewes mated with these groups in Victoria is shown in the maps herewith, and the actual figures as supplied by the Victorian Government Statist for 1942 in the main districts is given in the table below:—

VICTORIA.—EWES MATED 1942.

District.	With Merino, Polwarth, and Corriedale Rams.	With Rams of British Breeds.	Total Ewes Mated.
Mallee	159,000	715,000	875,000
Wimmera ..	751,000	529,000	1,280,000
Western	1,526,000	741,000	2,267,000
Northern	334,000	1,639,000	1,974,000
North-Central ..	279,000	485,000	763,000
Central	212,000	637,000	849,000
North-Eastern ..	284,000	609,000	893,000
Gippsland ..	204,000	283,000	488,000
Total ..	3,751,000	5,639,000	9,390,000

Flocks of ewes mated with Merino, Polwarth and Corriedale rams are run primarily for wool production, although considerable numbers of lambs may be sold as suckers, and nearly all survivors in saleable condition are finally sold as mutton, young or old.

On the other hand, ewes mated with rams of British breeds are kept primarily to produce fat lambs, or failing their suitability as such, to be fattened and sold later as crossbred mutton. In Victoria the number of half-bred ewe lambs bred and kept for later use as mothers of fat lambs is comparatively small, this State depending mainly on New South Wales for its requirements.

The number of such ewes which will come forward in the future is doubtful, but it is likely to be less than formerly because of the greater demand and higher price now for lambs, and also because of manpower and transport difficulties. It would be wise therefore, for Victoria to plan to produce such breeding ewes in greater numbers and the areas of lower rainfall could, in part, be suitably devoted to this objective.

There is no doubt that more meat will be ultimately produced if more of the ewes now intended for mating with fine wool rams are mated with rams of British breeds which are meat producers rather than wool producers.

It is known that some graziers and sheep farmers who usually mate some of their ewes, usually the older ones, with rams of British breeds, this year, under the pressure of labour difficulties, will reduce their total matings, confining them to the number required for maintenance of their wool-growing flocks, and plan to run more dry sheep. In the national interest and as far as can be forecast, this change is not considered advisable, and should be reduced to a minimum. The total sheep on some of such properties will need to be reduced later because of superphosphate rationing, but there should be no need as yet to revert completely to wool growing. There is more likely to be a shortage of meat than of wool during the war period.

Sheep in the Wheat Belt

In the Mallee, Wimmera, and Northern districts of Victoria, in which 95 per cent. of the wheat area is situated, 4,129,000 ewes were

mated in 1941-42. Of these, 2,883,000 were with British breeds of rams, this being 51 per cent. of the total so mated in the State. Not all were on wheat farms, but by far the greater number were run in conjunction with wheat growing.

In the same districts 1,244,000 ewes were mated with Merino, Polwarth, or Corriedale rams, the majority being in the Southern or Western Wimmera. Much of this country is rich enough to fatten lambs and is suitable for the production of good half-bred ewes by crossing Merino ewes with rams of the long woolled British breeds, or a Comeback type of ewe by crossing with the Corriedale. If the resulting lambs thrive they may all be sold as "fats," but otherwise they could be shorn, and the ewe lambs should be in demand for use later in lamb production.

In these districts green feed is usually abundant for some six months only, and can best be made use of by the production and marketing of lambs during that time.

Reduction of Wheat Areas

Because ships are not available for the export of wheat, this crop can be safely reduced in area. Shortages of manpower and superphosphate and the difficulties and uncertainties of transport and storage have caused many growers to sow even less than the area for which they are licensed.

Large farms which usually produce much more than 3,000 bushels may be expected to reduce their area of wheat next year, and it is probable that not more than 2,000,000 acres of wheat will be sown in Victoria in 1943 as compared with 3,000,000 acres in 1941. In addition, the area fallowed will show a corresponding decrease, so that next winter there should be 1,750,000 additional acres of wheat-growing land available for sheep production. On this area at least 500,000 additional ewes could be carried in a normal year. If these ewes were mated, 250,000 additional "spring lambs" might well be produced, leaving another 100,000 lambs to be shorn and held over until 1944.

Wheat acreage in 1942 is approximately as shown on the map, but some reduction has taken place in the Northern Mallee.

If it were decided to shear all the ewe lambs and hold them for sale later as breeders, a definite contribution to the ewe market of 1944 would be made with advantage to all concerned. It is seldom that good young half-bred ewes are valued at less than 25s. each after shearing.

Loading export lamb for Great Britain.

The northern wheat areas suffer from a low and uncertain rainfall, but they have the advantage of warmth in the winter and spring when both feed and stock grow rapidly. Lambs and mutton from the north appear first on the Melbourne market and participate in the higher prices almost invariably obtained prior to the rushed market period in October to December. If sufficient care of the sheep is taken in the autumn and early winter, hand feeding if necessary, the lambs should be ready for market by September at the latest.

To have the surest chance of producing early lambs, ewes with at least 50 per cent. Merino blood should be mated. For early fat lambs in the wheat belt, the Dorset Horn sire is the most reliable, but the Border Leicester cross is very popular as it is almost as good, though not quite as early, in a good year and in a less favorable season the lambs when shorn are very saleable. It is also the better cross for the production of half-bred ewe weaners, for which the cross with the Corriedale is also suitable.

It must be remembered that merely naming the breed does not describe the sire. Pure-bred rams of good constitution, conformation, and handle should be sought in whatever breed is chosen.

Hand Feeding Necessary in Lean Periods

Even in lean years fat lambs can be produced in the wheat belt if the ewes are kept in good condition through the summer and autumn. It is seldom necessary to hand feed in the winter when crops can be grown and fed off by sheep and lambs. It is unwise to allow breeding ewes to become poor, particularly before lambing, when hay and grain cheaply grown on the wheat farm may be used to great advantage. It is a decided advantage to hold the ewes in good condition at lambing time as practically all the troubles experienced with ewes at this period are attributable to the falling condition of the ewes.

Oats may be sown in March or April on the cereal stubbles at a time when farm work is not very pressing, to provide extra feed for the ewes and lambs in the winter and early spring. At least 60 lb. of oats per acre should be used. Superphosphate is not necessary for successful results and the limited supplies of fertilizer will be best utilized on the wheat crop sown on fallowed land. The early and mid-season varieties will provide more feed in the winter than will Algerian and Algeribee, the varieties recommended being Mulga, Dawn, Guyra, and Fulghum.

In the wheat areas of the Mallee where spring rainfall is so uncertain, it is unwise to feed off the wheat crop in the winter, as the loss in yield caused thereby will not be offset by the value of the feed so provided. In the Wimmera, however, and particularly on the heavy land, wheat crops sown fairly early can be grazed back until the end of August, and still recover to yield heavily.

When the maintenance and fattening of the sheep assumes greater importance than the harvest of maximum yields of wheat, then the wheat crop can and should be used for this dual purpose. The wheat and oat crops in conjunction can therefore be used in this way to maximum advantage with a minimum of labour and cultivation.

It is evident also that wheat cultivation costs may be reduced considerably by the greater use of sheep on the fallows which, if kept clean by sheep, lose little of their ability to produce heavy crops of wheat.

Registration of Vegetable Seed Crops Compulsory

IN order to protect the interests of seed growers, the Vegetable Seeds Committee has been empowered to require the registration of all crops of vegetable seeds being grown for sale. Any grower who disposes of his seed crop without being registered is liable to prosecution.

The National Security (Vegetable Seeds) Regulations provide that any person who is not a registered vegetable seed grower in respect of any particular seeds (including peas and beans) produced by him shall not sell, exchange, or in any way dispose of those seeds for valuable consideration.

In the early part of this year the Commonwealth Government established a Committee for the purpose of ensuring, as far as possible, an adequate supply of vegetable seeds during the present war. To this end the Committee has aimed at the production in Australia of the bulk of our seed requirements. It has collaborated closely with the seed-growing merchants and, through the State Departments of Agriculture, has arranged extensive contracts with growers throughout the Commonwealth.

Most growers have already registered with the Vegetable Seeds Committee, but those who have not should make application immediately to the Executive Officer, Vegetable Seeds Committee, Box 109, Canberra. There is no charge for registration.

The attention of pea and bean growers particularly is drawn to this notice. Many growers of these crops set out to produce green peas or beans with the intention that, if prices are unsatisfactory when the vegetables are ready for market, they are allowed to mature for sale as seed. Growers who propose to follow this practice should apply immediately to the Vegetable Seeds Committee for registration. Otherwise they cannot legally dispose of their seed.

Accredited Brucellosis-free Herds (Swine)

The following herds of pigs have been accredited as free of swine brucellosis (contagious abortion of pigs) by the Department of Agriculture.

An accredited brucellosis-free herd of pigs is one in which all animals therein have been subjected to two successive blood tests for brucellosis with negative results at intervals prescribed by the Chief Veterinary Inspector of the Department.

In order to remain accredited, a semi-annual or annual re-test (as determined by the Chief Veterinary Inspector of all animals in the herd shall be conducted. If at a re-test any animal fails to give a negative reaction to the test, the herd shall not be declared brucellosis-free again until two tests of the complete herd have been carried out with negative results.

Full particulars of the Accredited Swine Brucellosis-free Herd Scheme and application forms may be obtained from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Name.	Address.	Name.	Address.
Bodey, A. A.	"Bonnyview," Dooen	Horn, L. A.	Leongatha North
Bowran, L. G.	"Glendare," Tallangatta	Longerenong College ..	Dooen
Bright, George H. ..	Dumbalk	Northcote Children's Farm	Bacchus Marsh
Castle, L. H.	Clarinda	Pietsch, R. E.	Katyil
Critten, H. S.	Dumbalk	Rintoul, J. T. C. ..	Glengarry
Dookie Agricultural College	Dookie	Roy, W. A.	Morrell's Hill, via Boolarra
Doornbusch, John L. ..	"Starpark," Nhill	Spiers, Albert	Bamawm Extension
Fairchild and Clutterbuck	Tinamba	State Experiment Farm ..	Rutherglen
Geddes, L. D.	Bungaree	Sutherland, R. N. ..	Nullawill
Hamblin, A. T., & Sons..	Tooleen	Trenery and Soderlund ..	"Promview," Foster
Harrison, C. T. ..	"Eastside" Stud, Pemborneit	Trigg, A. J.	Bungaree
		Trigg, N. H.	Bullarook
Hawtin, I. E. and F. ..	"Rossmoyne," Colac	Tweddle, J. T.	"Winlaton," Shepparton
Haywood, Dr. A. R. ..	Hastings	Walch, M. U.	Baring

Potato Growing Campaign

Nearing Successful Conclusion

THE potato-growing campaign, instituted early in July of this year, and conducted by the Minister of Agriculture (Mr. E. J. Hogan) and officers of the Department of Agriculture, is nearing a satisfactory conclusion.

In the course of the campaign the Minister addressed meetings of growers at Wallace, Colac, Koroit, Daylesford, Trentham, Scotsburn, and Dunnstown, and the areas contracted for are a measure of the success of the campaign.

The department undertook to sponsor the planting of 56,500 acres in Victoria and in order to protect growers against the possibility of disastrously low prices in the event of surplus production, the Australian Potato Committee offered growers contracts which guaranteed the sale of all New or No. 1 grade produce at a figure not lower than certain specified minimums. There was no obligation on the part of growers to make contracts, except that fertilizer for areas of potatoes in excess of 1 acre was available only to contracting growers. Growers producing less than 1 acre of potatoes were not encouraged to make contracts.

It was considered that if contracts covering 50,000 acres could be obtained, it would be safe to assume that the total area planted in this State approximated the objective of 56,500 acres.

This opinion was based on the supposition that if 90 per cent. of the people invited to contract accepted the invitation, this would represent a magnificent response considering the general feeling of antagonism on the part of the rural community to any form of Governmental control of the disposal of their produce.

It is believed also that there would be at least 2,500 acres in the hands of men who were not invited to contract—that is, growers of 1 acre or less.

If it is assumed that 90 per cent. of growers invited to contract responded, the total area planted, on a 50,000-acre contract basis, would be 2,500 acres from small growers plus 55,500 acres from bigger growers, or a total of 58,000 acres. If it is assumed that 95 per cent. of growers invited to contract responded, the area then would be 2,500 acres plus 52,600 acres from bigger growers, or a total of 55,100 acres. From each of these totals one must anticipate a loss of 1,000 acres or more by people who find they cannot fulfil their contracts, leaving respective totals of 57,000 acres and 54,000 acres approximately. There may be a further unpredictable loss due to the waste in cutting large seed, and a consequent shortage on individual holdings.

The position in relation to potato-growing contracts at 5 p.m. on 18th November, 1942, was as follows:—

District.	Area under Contract. 1942-43.	Area from same Growers. 1941-42.	Number of Growers.
Ballarat	15,025	10,359	804
Koo-wee-rup	5,835	3,555	463
Otway	801	477	233
Warragul	4,734	2,860	659
Woodend	5,939	4,648	331
Warrnambool-Koroit ..	2,573	1,982	217
Kinglake	1,656	1,053	140
Emerald	3,594	1,997	330
North East	1,364	715	236
Romsey	1,663	1,199	141
South Gippsland ..	2,354	1,064	468
Colac	1,120	597	192
Portland	570	325	107
Miscellaneous	3,233	1,718	627
Total ..	50,461	32,549	4,948

Registration of Growers

Only those non-contracting growers producing more than ½ acre of potatoes are required to register. The response to the obligation to register is as yet very incomplete, probably due to the fact that the matter has not received very prominent publicity in the press.

In 1940-41 the Statist recorded 7,136 growers with an area of 44,196 acres. At the moment, the number of growers recorded is only 4,978, so that it is reasonable to suppose that there are at least 2,000 not registered. The majority of these would be handling very small acreages.

The result of the campaign for increased acreage is very satisfactory, especially in view of the difficulty and uncertainty of rural labour and of the acute shortage of potato seed. It is believed that another 2,000 acres of potatoes could have been obtained under contract had supplies of Carman and Up-to-date seed been available, and it is probable that another 1,000 acres could have been planted in small allotments. As it is, the area planted in household allotments must be substantial.

Certified Pullorum Tested Flocks

A certified Pullorum Tested Flock is one in which all the breeding stock have given a negative reaction to the agglutination test for pullorum disease, and in which all such stock are kept under rigid conditions of isolation approved by the Chief Veterinary Inspector.

The undermentioned flocks have been certified by the Department of Agriculture, and will remain so until the next breeding season or until such time as the Chief Veterinary Inspector determines.

Full particulars of this scheme appeared in the February issue of the *Journal of Agriculture*.

Application forms are obtainable from the Chief Veterinary Inspector, Department of Agriculture, Melbourne, C.2.

Owner.	Date of Certification.	Number of Birds.
Reformatory Prison, Castlemaine	6.3.42	200
"Fairview" Stud Poultry Farm (M. M. and A. J. Flack), Horsham	26.3.42	927
Stewart, J. A., Castlemaine	22.4.42	592
Rushton's Electric Hatcheries, (J. Rushton), Shepparton	28.4.42	653
Christie, R. R., and Son, Bentleigh	1.5.42	719
Becker, F. W., Cheltenham	1.5.42	315
Kostos, D., cr. Collins and Waverley roads	11.5.42	801
Evans, R., 50 Simpson-street, Kyneton	11.5.42	35
Throup, R. E., Neerim South	11.5.42	200
Berry, R., Campbell's Creek	11.5.42	87
Flack, Mrs. Florence, Horsham	11.5.42	100
Need, H. G., Warragul	15.5.42	254
Smith, R. Harcourt	15.5.42	97
Dookie Agricultural College, Dookie	19.5.42	447
Pettigrove, D. N., Kennington, via Bendigo	19.5.42	558
Wohlers, S., Jung	21.5.42	139
Throup, N. C., Neerim South	21.5.42	67
Mair, W. P., Tyabb	21.5.42	38
Horsfall, J. B., Lower Templestowe	26.5.42	720
Smith, F., Terang	1.6.42	947
San Miguel, Mrs. M. H., Box Hill	1.6.42	1,503
Rae, J., Sebastopol	1.6.42	1,497
Bartlett, O. E., Pimpinio	1.6.42	228
Cakebread, H., Shady Creek, via Buln Buln	3.6.42	112
Simpson, G. D., Tally Ho	3.6.42	680
Clark, H. N. Croydon	8.6.42	1,631
Abernethy, F. J., Horsham	.42	368
Heath, A. L., Spring Vale	8.6.42	130
Lowe, L. S., Bayswater	8.6.42	241
Youl, R. S., Wedderburn	8.6.42	757
Hewett, A., Bayswater	8.6.42	247
Thomas, Mrs. J., Outtrim	8.6.42	100
Barnes, J. H., Blackburn	8.6.42	978
Wimhurst, C. J., Tongala	8.6.42	417
Williams, V. (Wangaratta Hatchery), 91 Tone-road, Wangaratta	12.6.42	568
Kosch, E. W., Minyip	12.6.42	343
Mumford, L. J., Healesville	12.6.42	252
Broadbent, C. A., Yarraberb, via Derby	12.6.42	193
Massie, G., Shepparton	12.6.42	1,309
Shipp, R., Kerang	12.6.42	375
Hopkins, C. A., Shepparton	12.6.42	1,348
Hunt, R. R., Burwood	19.6.42	300
Henderson, C. W., Shepparton East	22.6.42	247
Mitchell, B., Kangaroo Flat	22.6.42	793
Gwyther, R. P., Highton, via Geelong	22.6.42	206
Hayes, R., Montrose	26.6.42	188
Sloan, G. J., Bayswater	26.6.42	191
Everard, H. L., Hawkesdale	30.6.42	321
Ridgway, G., Noble Park	30.6.42	76
Stephenson, Mrs. K., Research	2.7.42	93
Jones, M. A., Ringwood	2.7.42	283
Major, W. R., Girgarre	2.7.42	88
Walters, Mrs. V., Lower Templestowe	2.7.42	44
Grenville Stud Poultry Farm, Springvale South	2.7.42	1,640
Coupar, J. E., Nathalia	2.7.42	487
Clegg, R. M., Hamilton	7.7.42	14
Mackintosh, Walter C., Neerim South	8.7.42	194
Hurst, H., Eltham	9.7.42	913
Jackson, C. and H., Carrum Downs	9.7.42	94
Webb, A. E. H., Cranbourne	13.7.42	1,541
Scouller, R. C., Cobden	13.7.42	100
Gibbs, A. E., Stanhope	15.7.42	623
Abikhair and Tacey, Heidelberg	15.7.42	538
All Red Poultry Farm (E. M. Nichols), Yan Yean	15.7.42	460
Peck, D., Tally Ho	15.7.42	275
Pearse, Mrs. H. F., Donald	22.7.42	232
Hockley, N., Hamilton	22.7.42	22
Everist, F. R., Tyabb	29.7.42	40
Lumsden, R. G., Ballarat	1.8.42	11
Greenwood, J., Forest Hill	1.8.42	346
Bassett, R. A., South Muckleford	4.8.42	114
State Research Farm, Werribee	11.8.42	380
Hines, W. and C. A., Traynor's Lagoon, via St. Arnaud	12.8.42	1,096
Bradstreet, J. F., Tally Ho	22.8.42	120
Maher, A. E., Wal Wale	26.8.42	666
McKinnon, Miss M., Yielima, via Nathalia	1.9.42	113
Thomas, C. H., 325 Highbury-road, Burwood	2.9.42	142
Aitken, J., Silver-street, Cheltenham	16.10.42	727
Bethell, B., High-street, Templestowe	16.10.42	632
Gregson, R., Kyvalley	16.10.42	87
Hemphill, A. E., Monegeetta	16.10.42	401
Longerenong Agricultural College, Dooen	16.10.42	298
Mead, J. L., 28 Golf Links-avenue, Oakleigh	16.10.42	37
Nichols, W. G., Wandong	16.10.42	48
Stiles Bros., "Fair View," Wallan	16.10.42	784
Vogt, E. G., McSwain-street, Mentone	16.10.42	142
Wing Young, W., Dublin-road, East Ringwood	16.10.42	141
Batey, R. F., Invergordon South	30.10.42	822
Howard, A. P., Kyneton	4.11.42	254

WIND EROSION

Some Questions and Answers

By H. HANSLOW, Commissioner, State Rivers and Water Supply Commission,
and H. L. HORE, B.Agr.Sc., Inspector of Agriculture, Member, Soil Conservation Board of Victoria

Wind erosion has transformed this once fertile Mallee land into a desolate waste.

Mr. Mallee Farmer,

Landholders in the lower rainfall areas of the United States of America were careless about soil drift, with the result that a large area of their country was turned into the Dust Bowl, a desolate waste in what was formerly a prosperous area. Thousands of farmers were forced to migrate with scarcely more than they stood up in, yet if the proper precautions and corrective measures had been taken at the beginning, it need not have happened. What has happened in America can happen, and in fact at this moment is happening, here in Victoria. While not yet desperate, the position is serious, and calls for immediate and constant action, if we Victorians are not to have enormous tracts of fertile land converted into desert. Mr. Mallee Farmer, it is up to you to do something about it, and the following questions and answers may help and inspire you to immediate action, or, if you are already doing something in the matter, encourage you to still further efforts:—

1. QUESTION.—*What is wind erosion?*

ANSWER.—Wind erosion is the removal by wind action of valuable top soil that has taken thousands of years to form. Man's careless actions may cause its removal in a lesser number of days than it took nature years to form.

2. QUESTION.—*Would there have been any erosion in the Mallee if it had not been cleared?*

ANSWER.—Probably a little, but the land had to be partially cleared before it could be effectively settled. Experience has shown that far too much was cleared. More wind breaks should have been left.

3. QUESTION.—*Under what conditions will land drift (erode) most readily?*

ANSWER.—When bare fallowed or otherwise denuded of protective cover.

4. QUESTION.—*Is there any way to prevent fallow from drifting?*

ANSWER.—While there is no infallible preventative or remedy there are several methods by which drift can be greatly reduced.

5. Question.—*Are they costly to carry out?*

Answer.—No. Very little, if any, outlay of cash is required. Although some of the methods suggested may result in a slight reduction in the yield of wheat, erosion has not only decreased the yield from, but actually eliminated thousands of acres of wheat land in this State from production.

The ridge on which the men are standing consists of soil blown from the fallow in the foreground.

6. Question.—*Could you tell me of some of the methods used?*

Answer.—Crop stubbles play a very important role in erosion control. If not burnt, they act as a protective coat both before and after the land is fallowed. Where it is possible to retain sufficient straw or other trash on or near the surface of fallowed land, it will assist very materially in reducing the amount of drift.

7. Question.—*Isn't it much easier to work land after a good burn?*

Answer.—Yes. But you are selling land cheap when you let it blow away to save the labour cost of the extra work.

8. Question.—*Won't my land get "Take All" and other diseases into it if I do not burn the stubbles?*

Answer.—Not necessarily. Burning of stubbles is only part of the control of crop diseases, some of which (e.g., flag smut) can be largely overcome by the use of resistant varieties. If "Take All" is troublesome do not sow the paddock to wheat for some years. Prevention of drift may be more important than "Take All" control.

9. Question.—*What is the best time to fallow land likely to drift?*

Answer.—Land likely to drift should be the last to be fallowed. Ploughing on such areas may be delayed until the spring or even until the autumn. It is desirable that these parts should be judiciously grazed by sheep before ploughing. Land on which weeds and other herbage are kept well under control can be fallowed later than usual without much loss in the yield of the next crop. There is a big temptation to fallow clean land early in the season using a combine or cultivator to break the ground. This practice leaves the soil very fine and, in the absence of plenty of straw, areas so treated drift readily.

10. Question.—*But if I wait too long before I start fallowing how will I get the work done?*

Answer.—It is not suggested that you fallow all your land late. Get on with the job first on the flats and those parts less likely to drift. Patch out the drifty portions later. Drifty areas near roads, railways, and water supply channels, where the costs for removal of sand are likely to be greater than the benefits derived from fallowing, should not be fallowed at all.

11. Question.—*Is there any particular way land can be worked to minimize drift?*

Answer.—Frequent cultivation of the fallow before early autumn, and dry working are undesirable. An occasional cultivation and sheeping to keep weeds and other rubbish under control is all that is necessary. However, when rain is received in the autumn, no opportunity to work and ridge the land should be neglected.

12. Question.—*What about ridging up the fallow?*

Answer.—Yes, this certainly helps, but unfortunately the ridges don't last long in windy weather. A great deal of useful drift control work can be done after showers of rain in the autumn by ridging with a cultivator, those parts of the fallow where the soil has started to "run."

A fence on a fence. In addition to losing his best soil, the owner of this land has also lost the use of his fence.

13. Question.—*What is this cover crop I hear about?*

Answer.—Numbers of farmers sow cover crops on their light land when fallowed. The land is ploughed in the usual manner and at the normal time. Then, when the fallow is being worked with a combine after rain in the early spring, a light seeding of oats is sown on it. The crop which comes up is grazed off after the plants have become firmly established, and the roots and stalks are left to hold the soil over the summer months. If properly handled this method is most effective in reducing drift on fallow.

14. Question.—*Would longer rotations help in preventing drift?*

Answer.—Yes. It is better both for you and the land that you be a farmer and not a wheat grower only.

15. Question.—*Why is this so?*

Answer.—The reasons are not as yet fully understood. However, long rotations involve less land under cultivation and hence in a condition to drift readily. It may also assist to consolidate the soil to leave it out to grass for a few years and the grass roots will tend to hold the soil in a sod when it is again ploughed. Longer rotations create conditions in the soil less favorable for the development of crop disease.

16. Question.—*If my fallow starts to drift what is the best way to check it?*

Answer.—If you are fortunate enough to get some rain ridge the fallow as much as possible, or put some deep furrows across it. You must start drift control measures early in the season, otherwise you have little chance of holding your soil once it begins to move.

17. Question.—*Suppose in spite of precautions some places on my fallow were blown and the subsoil exposed, what should I do then?*

Answer.—Get some strong implement and break up these spots. Get down deep and make it rough. These patches will then collect drift sand and instead of increasing in size they will be healed. In gateways where sheep have trampled the soil fine and flat treat the same way, for here is a place where drift will start and once started you can never tell where it will finish. Last July we were standing on a hill with a friend who asked, "What are those light-coloured patches in the crop? Come and see." The answer was, of course, that they were where the soil had blown away. On examination it was seen that this was so and here the crop was very light, plants being stunted, no

The disastrous effects of wind erosion pictured above could have been prevented by timely corrective measures. [*Weekly Times* photo.

stools, one stalk to the plant. If we could put all those spots in the paddock into one plot it would look a very sorry plot. Say, Mr. Mallee Farmer, the way the soil is going from a lot of Mallee paddocks, the patches will soon be over most of the paddocks.

Top.—A well-grassed Mallee sand ridge.
Below.— The same ridge in an adjoining paddock.

18. Question.—*Would you treat wind-scoured patches on land out of cultivation in the same way?*

Answer.—Yes. They could be broken up or if they are small, dump stable manure, branches, or any sort of rubbish on them. It is important to treat them as early as possible so they don't enlarge.

19. Question.—*I have a sandhill the top of which has been swept clean. How would you suggest I should treat it?*

Answer.—Plough it roughly—a series of furrows would do. Some sand will get mixed with the clay. A crop of rye corn sown on this should grow quite well and help to bring the soil back to a better condition.

20. Question.—*I have a lot of trouble with soil drifting into my dams and channels and over my fences, and my stock get out and annoy my neighbours. Fencing is very expensive these days. Is there any way to stop this drift?*

Answer.—Well, yes, there is. Practice drift control methods on your fallow and as an extra precaution refrain from fallowing within 3 chains from these fences, dams, and channels. The stubble or grass on the strip will catch the drift and save you a lot of trouble. It would be alright to crop these strips when the rest of the paddock is sown. "Yes," you say, "at the cost of a much lighter crop on those strips." Well, yes, but that is only for the crop after you fallow the paddock, besides, you do want to save your dams, channels, and fences, don't you?

21. Question.—*Can you suggest any treatment to make a loose sand bank "stay put"?*

Answer.—Try sowing it down with a crop of rye corn. This cereal does an excellent job both on loose sand and on wind-swept areas. It will be necessary, of course, to prevent over-grazing.

22. Question.—*You stated that bare fallow was responsible for most of the wind erosion in Mallee areas. Is there any other outstanding cause?*

Answer.—Yes, I would say over-stocking runs a close second.

23. Question.—*How is that?*

Answer.—Well, with a run of good seasons, the farmer is tempted to carry as much stock as he can. A dry time sets in. No one will buy the sheep. They walk around the paddocks looking for feed, eat everything out, leave the soil bare, cut up the surface with their small feet and away blows the soil. Once started it is hard to stop.

24. Question.—*Can you give me any general information that I should keep in mind?*

Answer.—Do not forget that different paddocks on your farm, and even different parts of the same paddock may require different treatment when about to be cultivated. If those parts most liable to drift are attended to in particular, much erosion damage will be prevented.

25. Question.—*When is the best time to start erosion control practices?*

Answer.—Right now.

A question to you.—Australians are fighting to save our land from the enemy. Are you on the home front going to allow the best of that land—the fertile top-soil—to be blown away?

Your answer.....?

PARASITES OF CATTLE

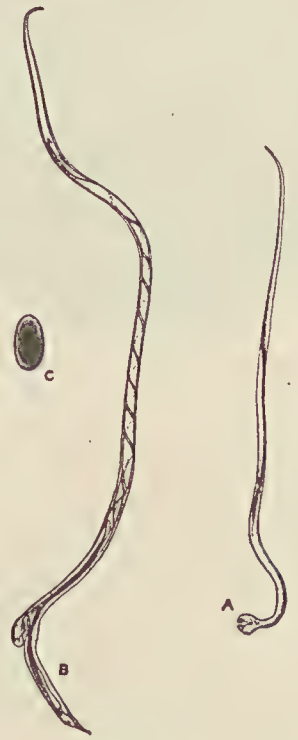
By the Veterinary Staff, Live Stock Division

WORMS are much more detrimental to the health of cattle than stock-owners generally realize. Although mortality from infestation with worms is relatively uncommon, the economic wastage due to the ravages of worms, especially in young cattle, is extremely serious. Interference with nutrition, with consequent lack of growth and development of young cattle, and digestive disturbances with loss of condition in adult cattle, are frequently the result of parasitism of the alimentary tract. Suitable treatment and the adoption of rational hygienic measures may prevent to a large extent the ravages of worms in cattle.

Stomach and Intestinal Worms

One of the commonest types of worms affecting cattle is the group known as Trichostrongyles or Short Hair Worms, which includes numerous varieties of small hair-like worms which are very difficult to see without the aid of a magnifying glass. They are found in both the fourth stomach and the intestinal tract, and when present in large numbers give rise to a condition known as Trichostrongylosis. Another type is the twisted wire worm or round stomach worm (*Haemonchus contortus*). This is the largest of the stomach worms affecting cattle, and is found in the fourth stomach, although, in cases of heavy infestation, it may be found in the first portion of the small intestine also. It is a thin, thread-like worm ½ to 1½ inches long, and the females are characterized by red and white striping of the body, giving it a twisted "barber's pole" appearance. This is due to the curling of the ovarian tubes around the blood-filled intestinal tract. Although not so common here as in the northern States of the Commonwealth, infestation with this worm has caused acute parasitic gastritis among young cattle.

The stomach and small intestinal worms of cattle have similar life histories. Each female deposits thousands of eggs, which pass out in the animal's faeces, or droppings, and under suitable conditions of warmth and moisture the eggs hatch out within a few hours, but in cold weather this may be delayed for days. The small embryos, after feeding for three or four days upon the faeces, undergo certain changes,



Stomach worm.
(*Haemonchus contortus.*)
A.—Male. B.—Female. C.—Egg

and then ascend blades of grass and are ingested by grazing cattle. This stage is an extremely resistant one, and under favorable conditions of heat and dryness worm larvae may survive on pastures for months, although long periods of drought and extreme cold markedly shorten the period of survival. After passing to the stomach or intestines, the larvae bore into the mucous membrane. They grow rapidly, and become mature within three weeks.

Trichostrongylosis, the condition caused by the short hair worms, mainly affects young cattle from weaning up to two years of age. Outbreaks usually occur during autumn, winter, and early spring. Older cattle are more resistant to these worms, but if grazed on heavily worm-infested pastures at times when the pasture has lost much of its nourishment, trichostrongylosis may develop even in them. In young cattle affected with trichostrongylosis

The short hair worm which causes trichostrongylosis. Natural size.

[After *Ross and Gordon.*

the most marked symptoms are stunting of growth and scouring. Quite frequently only certain individuals in a herd of young stock show evidence of this disease, and in addition to being under-developed, they present a dejected, unthrifty appearance, while the faeces are greenish black, liquid, and offensive. Symptoms of anaemia may not be apparent for some time, and bottling under the jaw is rarely seen. When scouring develops, condition is lost rapidly, although affected animals may linger in an emaciated condition for weeks before succumbing.

Symptoms.

In cattle affected with the twisted wire worm the chief symptom is anaemia, indicated by paleness of the mucous membrane of the eyes, mouth, and vagina; dropsical swelling between the lower jaws (commonly called "bottle jaw"), loss of condition, and depraved appetite. Diarrhoea is not a regular feature. Both young and old cattle are affected, mainly in the late spring, summer, and autumn. Young cattle, if heavily infested, may succumb while still in good condition. This worm is an avid blood sucker, and the anaemia, which is a characteristic symptom of its effects, is directly due to the abstraction of blood from the lining of the stomach.

Treatment.

As with sheep, treatment for worms in cattle consists of drenching with a solution of copper sulphate (bluestone) and nicotine sulphate. The copper sulphate should be of good quality, and is best obtained from a chemist. The mixture consists of 2 oz. of copper sulphate, 1 oz. of nicotine sulphate, 1 gallon of water, and must be prepared in an enamel or earthenware vessel. The copper sulphate should be dissolved in about a quart of boiling water, cold water added to make 1 gallon, and then the nicotine sulphate added. This quantity is sufficient to drench sixteen mature cattle. The dose required varies with the age of the animal according to the following table:—

Mature cattle	10 oz.
Yearling cattle	6-8 oz.
Calves	4 oz.

On grossly contaminated pastures, cattle will rapidly become re-infested, and for this reason one treatment is not sufficient. Drenching should be repeated three times at intervals of fourteen days. Starvation prior to drenching is unnecessary. Wormy cattle should also be given a supplementary ration of concentrates to build up the constitution, which is weakened by the ravages of the worms.

In those parts where winter rainfall is heavy and cattle have been running on the same paddocks for some years, it is wise to anticipate outbreaks of trichostrongylosis in young stock and commence drenching in the autumn before any symptoms of the disease appear. During the winter another course of three drenchings is advisable and, on farms where outbreaks have occurred previously, young stock should be drenched also during early spring before the flush of the season.

Recently research workers overseas have shown that phenothiazine is more effective

The twisted wire worm or round stomach worm. Natural size.

[After *Ross and Gordon.*

against trichostrongyle worms than is the drenching mixture given above. When procurable this drug can be administered as a drench or mixed with the feed. The dose rate is as follows:—

Adult cattle	.. 2 oz.
Yearling cattle	.. 2 oz.
Calf, 9 months old	1½ oz.
Calf, 6 months old	1 oz.
Calf, 4 months old	½ oz.

When dosing against the "barber's pole" worm above, the use of nicotine sulphate is unnecessary. At present supplies of this drug must be conserved, and bluestone alone at the rate of 2 oz. in a gallon of water is quite effective.

Showing nodules formed in the intestine as a result of activity of the nodular worm.

Nodular Worm

Another worm common in cattle in Victoria is the nodular worm (*Oesophagostomum radiatum*). This is a short thread-like worm found in the large intestine. The young worms invade the bowel wall, and cause the formation of small rounded nodules. Consequently, the condition of nodular disease has become universally known as "pimply gut" or "knotty gut." The adult worms are white in colour, and vary in length from ½ to ¾ of an inch. This parasite has a wide distribution in Victoria, particularly in areas of high rainfall, and where irrigation is practised.

The life cycle of the nodular worm resembles closely that of the worms previously described, up to the stage when the larvae became encysted on the pasture. When swallowed the larvae pass with the food to the small intestine, where they migrate into the bowel wall, causing nodules, which vary in size from that of a pin's head to that of a pea, and contain varying quantities of whitish or greenish pus. In these nodules the larvae undergo further development and return to the bowel after a variable period of 15 to 150 days, reaching maturity in a few days. Migrating larvae may lodge in other portions of the digestive tract, and in the liver, intestinal lymph glands, and omentum or caul, where they die.

Old nodules are frequently cheesy in consistency or even gritty, due to the deposition of lime salts. Normal digestive processes are greatly interfered with by the presence of nodulation. The common symptoms of nodular disease are wasting and diarrhoea. In very acute cases the animal may walk with a stiff stilted gait, particularly in the hind limbs.

Treatment.

Treatment for oesophagostomiasis ("pimply gut") is not as satisfactory as for other worms in cattle, as the main symptoms are the result of the nodulations in the bowel wall, and these nodules are not affected by drugs. The incidence of infestation on a property may be reduced, however, by the elimination of the adult worm from the large intestine of cattle with phenothiazine, thus reducing the contamination of the pasture.

Lungworm

Still another worm affecting cattle is the lungworm (*Dictyocaulus filaria*) which inhabits the air passages in the lungs. The lungworm has proved troublesome only in young cattle from weaning age to about eighteen months. The adult worms are white in colour and thread-like, and 1 to 4 inches in length. They are found lying coiled in tangled masses, mixed with mucus, in the terminations of the air passages, although in heavy infestations they may actually be found in the windpipe.

Lungworm disease is common in low-lying marshy districts of high rainfall, and in areas subject to inundation, and on poorly drained irrigation areas. Usually it appears in the autumn and winter when the nutritive value of pasture is at its lowest. The eggs of the lungworm are laid in the bronchi and are usually coughed up and swallowed. They hatch out in the bowel, and the embryos pass

The lungworm. Natural size.
[After *Ross and Gordon.*

out with the faeces. After feeding for about eight days they become encysted on blades of grass, and are then ingested by grazing animals. The larvae bore through the wall of the intestine into blood vessels and are carried to the lungs in the blood. Five to seven weeks later adult worms are found in the bronchi.

In an affected herd one first notices an odd animal coughing, especially following exertion. In the early stages the cough is short and dry but later often is accompanied by a discharge of mucus from the nostrils or mouth. This discharge contains ova and embryos, and frequently is swallowed when coughed into the mouth, the larvae being passed later in the faeces. The disease develops as an insidious bronchitis which may develop into pneumonia. As it progresses affected animals may show emaciation, anaemia, dry harsh coat, hide bound, bottling of the jaw, and swelling of the dewlap. Death may result from pneumonia or exhaustion.

Treatment.

Treatment with drenches has not been successful owing to the location of the parasites in the lungs. Lungworms are seldom found as a sole infestation, and are usually associated with stomach and intestinal worms. Drenching for these will greatly relieve the affected animals, and if they are moved from the source of infection and given an abundant supply of good food, they can usually withstand the effects of the lungworm and gradually recover.

Preventive Measures.

Where infestation with stomach, intestinal, or lung worms has proved troublesome, preventive measures should be adopted to protect the cattle, especially young animals. Affected animals should be removed to clean pasture and drenched at least three times at fortnightly intervals. A system of rotational grazing and spelling of paddocks, should be adopted. Horses and sheep may be grazed on paddocks being spelled. Weaner calves should not be grazed on areas which have previously been used for older cattle. Provide adequate nutrition to build up their resistance.

Burning off infested pastures should be considered, as this is a valuable aid in preventing infestation assuming serious proportions. Care should be taken, however, not to prevent seeding of grasses.

Overstocking should be avoided. Attention should be paid to the adequate drainage of properties, as cattle on badly drained paddocks are much more subject to infestation with worms.

Where strict attention is paid to these details as part of the routine management of the farm economic wastage due to ill effects from worm infestation will be reduced to a minimum.

Tangled masses of lungworms appear in the termination of the air passages.

Liver Fluke Disease

While the prevalence of liver fluke diseases in sheep has been recognized for a long time, it is only in comparatively recent years that stock-owners have realized that the same fluke may cause serious trouble in cattle.

As in sheep, sudden deaths may occur in cattle from black disease which occurs only as a result of fluke infestation, or the flukes may cause more lingering sickness from their effects on the liver. Acute fluke infestation may also cause deaths.

Liver flukes (*Fasciola hepatica*) are flat, leaf-like parasites, which live in the bile ducts, where they grow to maturity and lay their eggs, which are eventually excreted in the animal's faeces. Under favourable conditions embryos hatch from these eggs, and, to complete the life cycle, must enter the body of a fresh-water snail. From this intermediate host they pass on to the pasture and are ingested by grazing cattle. The complete life cycle and methods of eliminating the fresh water snail that shelters the fluke are described fully in a pamphlet which may be obtained free of cost on application to the Department of Agriculture, Melbourne.

Liver fluke disease in cattle is very prevalent in irrigation areas and occurs also in districts receiving a heavy rainfall, especially in swampy or low-lying country.

Cattle of any age may be affected, young cattle from nine to eighteen months' old being particularly subject to ill-effects from the parasite.

Cattle affected with liver fluke usually become poor and unthrifty, with a dry, staring coat. The membrane of the eyes and mouth becomes very pale, and a flabby "pouch" or "bottling" frequently develops under the jaws. The animal may gradually waste away, and it is not uncommon for the owner to suspect that it is suffering from tuberculosis. Diarrhoea also may be present.

If an animal dies or is killed and the liver examined the adult fluke may be found in the bile ducts. These ducts become much thickened and tend to stand out as white cords in the liver surface. This condition is known as chronic fluke disease. When cut the bile ducts are gritty. In cases of acute fluke disease death may occur, and is due to the damage caused by the larval forms as they burrow through the liver tissue. In these cases the liver surface is found to be covered with small, cloudy-white spots about $\frac{1}{8}$ in. in diameter. Each spot marks the site of entry into the liver of a larval fluke.

Chronic and acute fluke disease can readily be differentiated from black disease, where areas of liver tissue become yellowish, softened, and necrotic or dead.

Although carbon tetrachloride has long been recognized for the treatment of liver fluke in sheep, for many years it was considered an unsafe drug for use in cattle. In recent years, however, it has been found that it is safe to use, provided certain precautions are taken.

Only cattle suspected of being actually affected wih fluke should be drenched. Cattle that are apparently healthy and doing well should not be drenched with carbon tetrachloride. It is a waste of time, money, and the drug, and actually may be dangerous.

Two or three cattle only should be drenched at a time, and the drenching should be done during mild weather. Mineral deficiency may make animals more susceptible to ill effects. Animals should not be changed suddenly to different pasture immediately before or after drenching.

Always use a drench freshly prepared by a reliable chemist. If carbon tetrachloride is to be kept from one season to the next it

Showing fluke infestation of the liver. Note the thickened bile ducts.

should be kept in a tightly corked, dark-coloured bottle, away from the light.

Carbon tetrachloride will taint milk if given to milking cows.

The drench for adult cattle is 4 c.c. of carbon tetrachloride in ½ pint of paraffin oil. The mixture should be well shaken before use and given carefully.

Small cows or heifers should receive 3 c.c. only of carbon tetrachloride and six to twelve months' old cattle 2 c.c. in ½ pint of paraffin oil.

Young stock should not be kept in paddocks where they will be re-infested with fluke, and should be fed well.

An older method of treatment is to dose affected cattle with liquid extract of male fern. The dose is 1 drachm for each 60 lb. body-weight of the animal. It is given with warm milk, raw linseed oil, or castor oil.

As in sheep, the presence of liver fluke in cattle may predispose the animals to black disease. This latter disease may be prevented by vaccination, the same vaccine being used as for sheep, but the dose for cattle is 10 c.c. The vaccine is injected under the skin along the side behind the foreleg. Full particulars on black disease are given in another departmental pamphlet which may be obtained free of charge on application to the Department of Agriculture, Melbourne.

Hydatid (Echinoccus) Disease

The hydatid is the cystic stage of a small tapeworm (*Echinococcus granulosus*) which lives in the small intestine of dogs and wild carnivores. The cysts are commonly found in sheep, cattle, pigs, and also in man.

Life Cycle.

The hydatid tapeworm is composed of four or five segments and, when mature, attains a length of not more than one-fifth of an inch. It inhabits the small intestine of carnivores, but the domestic dog is the most important primary host in relation to cattle and human infestation. As with all tapeworms each segment is equipped with both male and female reproductive organs. The final segment of the tapeworm becomes filled with fertilized eggs and when mature becomes detached and passes out with the faeces. The eggs are unable to develop any further unless they are eaten by a susceptible animal. Infestation of cattle and sheep usually occurs while they are grazing over pasture contaminated with either infected canine faeces or dust blown from the vicinity of kennels. Within the intestine small embryos hatch from the eggs, bore through the bowel wall into the blood stream in which they are carried to various organs. These embryos grow slowly and gradually develop into hydatid cysts.

The cysts vary in size from that of a marble to that of a small orange, and are most commonly found embedded in the substance of the lungs and liver. They appear as white or yellowish-white bladder-like structures containing a clear watery fluid and numerous sago-like tapeworm heads. Hydatid cysts may persist for a considerable period, although in cattle they tend to degenerate when the contents of the cysts are replaced with a cheesy substance in which lime salts frequently are deposited.

For completion of the life cycle the cysts must be ingested by a dog. This is commonly brought about by feeding dogs on raw offal containing cysts. During digestion the small tapeworm heads, which are armed with minute hooks, are freed, and they attach themselves to the mucous lining of the small intestine and grow into adult worms.

Effects and Symptoms.

As the majority of the hydatid cysts in cattle are infertile, and undergo degeneration, symptoms directly attributable to this disease are rare. In cases of heavy infestation, however, the normal action of certain organs, particularly the lungs and liver, may be impaired by reason of the mechanical pressure induced.

Prevention.

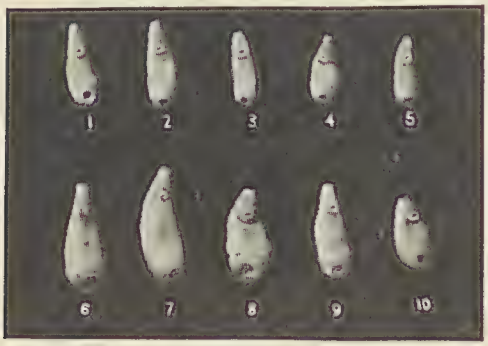
All measures to control this disease of cattle, sheep, and man should aim at the elimination and prevention of infection among dogs. Dogs should never be fed on raw offal of sheep, cattle, or pigs.

Two classes of dogs, (*a*) slaughter-house dogs and (*b*) station dogs, are of primary importance in the transmission of hydatid disease, as they are most commonly fed on raw offal. It should be a routine practice for the owners of all dogs not to feed offal until it has been boiled for ten minutes; this will render all cysts harmless. Dogs should be rigorously excluded from all abattoirs and slaughter houses. Infested dogs can be effectively treated to remove the tapeworms.

To prevent infection in man the hands should be thoroughly washed after handling dogs especially before a meal. As a high proportion of cases of hydatid disease are contracted in early life, children should not be allowed to handle station dogs.

The Stomach Bot

The stomach bot (*Paramphistomum* spp.), which belongs to the fluke family, is often found in the first and second divisions of the stomach, namely, the rumen (paunch) and the reticulum (tripe) of cattle. It has a small cone-shaped body, pale pink in colour, varying from ¼ to ½ in. in length, and attaches itself to the stomach walls by the pointed end. In this position the adult parasite does not cause any ill effects, but if present in large numbers the immature parasites which are found in the intestines may set up profuse diarrhoea.



Showing the variation in size and shape of the stomach bot.

Coccidiosis

Coccidiosis, sometimes referred to as "dysentery of cattle," is caused by a minute organism (*Eimeria Zurnii*) which penetrates and destroys the lining of the large intestine, giving rise to a severe and often fatal disease. These organisms, or coccidia, are passed out in the faeces from infected calves, and the disease is transmitted to healthy animals by grazing on infested pastures, or drinking contaminated water. Young cattle up to two years are the principal sufferers.

Symptoms.

The disease is more prevalent during the warmer part of the year, especially in wet years, and in changeable weather, and the first symptom noticed is a sudden attack of diarrhoea with the faeces blood-stained, or containing clots of blood and mucus, and having a very offensive smell. The period of incubation—that is, the time between infection of the animal and the first appearance of symptoms—averages about 21 days, although in some cases it is much less.

Mild cases, especially in older cattle, recover rapidly, but with young beasts the symptoms may become increasingly severe; emaciation becomes marked, and the gait staggering. The eyes become sunken, the animal goes down, and death takes place from exhaustion.

Treatment.

For treatment to be beneficial, pasturing should be stopped, dry feeding substituted, and pure drinking water supplied. If very young calves are affected, they should be kept exclusively on a diet of fresh warm milk. This often ensures a rapid improvement in condition. If affected animals are kept in a shed, the floor should be cleaned and disinfected daily, and the soiled bedding should be bu
Hot caustic soda solution is the best disinfectant for floors. A great number of drugs have been used for the treatment of coccidiosis but so far no specific drug fatal to coccidia has been found. Recovery may be assisted by the judicious administration of astringents such as tannoform and bismuth, and intestinal disinfectants such as thymol and creolin.

Prevention.

Avoid over-stocking, provide a supply of clean drinking water from troughs, and do not rear calves in paddocks with older cattle.

Beef Measles

The beef measles parasite comprises one of the stages in the life history of the tapeworm (*Taenia saginata*) of man. This worm occurs in the intestines of man, and when mature varies from 3 to 8 yards, and occasionally up to 10 yards in length. The intermediate or bladder worm stage (*Cysticercus bovis*) is found in the musculature of cattle where it is known as "beef measles." The cysts do not set up any symptoms in infested cattle. They are found chiefly in the muscles of jaws, heart, and diaphragm, although in heavy infestations they may be distributed through the muscles of the body. They measure about ⅜ by ¼ inch, and each contains a single tapeworm head. When affected beef, either raw or insufficiently cooked, is eaten by man, the cyst wall is digested, and the tapeworm head is set free in the bowel where it develops. As segments of the worm containing the eggs

mature, they are passed out of the bowel in the faeces, and if deposited on pasture land may be picked up by grazing cattle.

It should be remembered that ordinary cooking methods effectively destroy this parasite.

Fragment of muscle containing the cystic stage of beef measles.
[After *Railliett.*

EXTERNAL PARASITES

In Victoria there are not many external parasites that infest cattle, the principal being ringworm and lice.

Ringworm

Ringworm is a very common complaint in cattle, and principally affects young calves, but may occasionally spread to older cattle. It is caused by a parasitic fungus (*Trichophyton*) which generally attacks the head, especially round the eyes and lips, but may spread to other parts of the body.

Symptoms.

The first symptoms are small circular bare patches of skin which may grow together, and form large irregular-shaped areas. At first the hair is erect, and gradually the skin becomes encrusted with scales. These patches are more marked and rougher on dark skins than on light ones. The crusts and the hair may be rubbed off by the animal scratching or rubbing the skin due to the accompanying irritation. This may cause bleeding and excessive thickening of the skin.

Treatment.

When treatment is being carried out, it is essential that the curative agent be applied well beyond the margin of the bare patches, so that the infection will not extend further. One of the following remedies may be used, and a cure may be considered complete as soon as the denuded patches become covered with a growth of young hair:—

Sulphurated potash.
Tincture of iodine.
Stockholm tar, 1 part; olive oil, 2 parts.
Soft soap applied as an ointment.

Any of the above should be applied once or twice daily.

Potassae sulphurata (sulphurated potash) may be used as a mixture, 2 oz. to 1 gallon of water. It should be rubbed well into affected parts with an old nail brush.

As ringworm is very contagious, care should be taken in handling and treating the affected animals, which should be isolated, and their surroundings, such as calf pens, rugs, &c., thoroughly disinfected.

If man or other animals contract this disease, the same treatment as for cattle should effect a rapid cure.

Lice

Cattle lice, of which there are three distinct species, are the commonest external parasites affecting these animals. One of these is the biting louse (*Bivicola bovis*), and the other two are the short-nosed sucking louse (*Haematopinus eurysternus*), and the long-nosed sucking louse (*Linognathus vituli*). All these lice lay eggs which become attached to the hairs of the host.

The Biting Louse.

The biting louse is a small yellowish louse with a blunt broad head, and is usually found along the withers and rump, and sometimes along the back. It causes intense irritation, leading to constant rubbing until the skin becomes raw and bleeding. The eggs of this louse hatch out in about ten days.

Sucking Lice.

The short-nosed louse is greyish in colour on the body, and brown at the anterior end. The head is short and blunt, being about as

broad as it is long. The eggs hatch out, and become mature in from 23 to 30 days. This species usually attacks adult cattle.

The long-nosed louse has a head twice as long as it is broad, and is a smaller and more slender parasite. The body is dark grey, and the head and front portion of the body are nearly black. The eggs of this species hatch out, and the lice mature within 21 to 25 days. Young cattle are generally infested by this variety.

Both varieties feed by piercing the skin and sucking the blood, and as this process causes great irritation, it leads to interference with animals grazing, and consequently lowers the vitality and leads to loss of condition and general unthriftiness.

The biting louse (Bovicola bovis).

The short-nosed sucking louse (Haematopinus eurysternus).

Sheep dips are not recommended, owing to the danger of arsenical poisoning from the animal licking itself.

Sump oil is sometimes used, but should only be lightly applied, owing to the risk of scalding the skin.

As lice may survive for two or three days away from an animal, it is obvious that where stock are housed all rugs, brushes, &c., should be disinfected, bedding destroyed by burning, and walls and posts sprayed with some disinfectant solution.

Treatment.

Treatment consists of the application of one of the following dressings, which should be applied two or three times, at intervals of ten days. This will ensure the destruction of any young lice that have hatched out after the previous dressing.

Kerosene emulsion, made by dissolving 1 lb. of soft soap in 1 gallon of boiling water, and gradually adding 1 pint of kerosene, constantly stirring until the whole is emulsified. This mixture should be gently rubbed well into the hair.

Nicotine sulphate 1 oz., mixed with 1 gallon of soapy water, and scrubbed in well with a stiff brush, and allowed to dry in the sun.

The long-nosed sucking louse (Linognathus vituli). [*Qsld. Agri. Jnl.*

Sheath Rot in Sheep*

Treatment by Fasting

THE following article embodies the results of a very recent experiment under practical conditions, using fasting as a means of treatment for all kinds of sheath rot in sheep.

Cases of sheath rot which had been sent periodically to the McMaster Laboratory of the Council for Scientific and Industrial Research in Sydney cleared up within ten days almost without exception. Factors possibly responsible for this were a change of environment, change of feed, and absence of food during transit, as well as loss of appetite for a few days after arrival.

In August, 1941, an experiment designed to measure the effect of the environmental factor was conducted at Boatmen, in south-western Queensland. In this experiment an attempt was made to reproduce the same conditions experienced by wethers transferred to the laboratory. Cases of balanitis were subjected to four days almost complete fast, then allowed a limited ration of oaten hay for a further eight days, while being left in a shed and allowed unlimited bore water. Oaten hay was selected as a diet which would maintain an acid urine already produced by a four days fast. Recoveries under these conditions were spectacular.

The question then arose as to whether similar results could be obtained under paddock conditions by very restricted grazing with an almost complete absence of feed and free access to a bore drain. Information was also desired as to what effect this treatment would have on the general condition of the sheep.

At Wheatlea, in south-western Queensland, through the kind assistance of G. Nagel, esq., it was possible to obtain 92 cases of sheath rot. Unfortunately, owing to the difficulty of transport at this time, the cases were not seen prior to the treatment, but the manager gave an assurance that he had selected the cases very carefully. This assurance was confirmed when the sheep were subsequently examined, as it is always possible to detect cases in which the sheath has recently been affected internally. It can be safely assumed that over 80 per cent. of the cases were severely affected with internal lesions of the sheath at the commencement of the experiment.

For the first ten days, the wethers were kept in a small holding paddock with plenty of water, but with practically no feed. For the next nine days, the wethers were allowed out and shepherded for an hour each day, then returned to the paddock. Five sheep escaped from the group during the experiment, but none died.

On 29th September, 87 wethers subjected to the treatment were very carefully examined, and classified into the following categories:—

(*a*) Wethers showing *complete* absence of sheath lesions, both internal and external—i.e., complete recovery 62

(*b*) Wethers showing complete absence of internal lesions but still showing slight external lesions .. 7

(*c*) Wethers still affected to a minor degree with internal lesions. A small amount of fluid contaminated with pus could be obtained on pressure. The preputial opening was not blocked. Judging from the previous observations at Boatmen complete recovery in these cases could have been expected within a few more days 11

(*d*) Wethers affected to some degree with internal lesions. Pus was still present in considerable amounts, but palpation revealed that the area involved had been considerably reduced, i.e., that there had been some improvement. The preputial opening in some of these cases was blocked by a plug of pus 3

(*e*) Wethers in which no improvement could be detected, and in which blockage from pus and external scabs were still present .. 4

* Statement issued by the Council for Scientific and Industrial Research.

[*Continued on page 634*

Pig Raising in Wheat Areas

By L. A. DOWNEY, H.D.A., Pig Expert

THE pig-grain price ratio is a very important factor influencing pig production, but when grain forms the major part of the pigs' diet, the men who grow the grain and feed it to pigs have a big advantage over those who have to pay the cost of distributing the grain to dairying districts. And so, with the prospect of a more stable price for pigs, even though it may not be so high as pig raisers have been receiving in the past few months, there is reason to believe that pig raising in wheat areas will continue to increase. More of those growers who have surplus wheat, barley, and oats will be putting some of it into pig production on their farms, and for their benefit a few points that should be of interest are set out hereunder.

Large White pig bred from long-bodied parents and self-fed from the age of 3 weeks; weighed 230 lb. alive and 180 lb. dressed, when 151 days old. The carcass was graded choicest at the bacon factory.

Under the conditions prepailing in the wheat-growing areas, some peculiar problems confront pig raisers. Firstly, while the cereal grains are most valuable as the major part of the pigs' diet, they do not provide a complete and balanced ration, and unless small quantities of supplementary foodstuffs are added, trouble will occur in the form of slow growth and disease in young pigs and poor fertility in breeding pigs, due to deficiencies of proteins, minerals, and vitamins.

To each bag of grain fed there should be added 7 lb. of meatmeal, 2 lb. of ground limestone, and ½ lb. of salt. The meatmeal may be deleted when the pigs are receiving half a gallon of milk or more per head daily.

Green pasture is most desirable as a source of the essential vitamin A and of protein, and should be provided whenever practicable. In its absence, a daily supply of a small quantity of green fodder, preferably lucerne, grown in a garden plot, will serve the purpose, and when neither of these is available some hay or chaff, preferably lucerne, should be provided. The value of green food cannot be over-estimated, and as its absence is a limiting factor in the raising of healthy and fast-growing pigs, the establishment of an area of dry grazing lucerne or of a plot under irrigation in the house garden is strongly recommended.

Wheat growers need not follow the same intensive methods of pig raising as are practised in the dairying districts. Larger paddocks can be used, self-feeders can be put out in the paddocks feeding large numbers of pigs, even of varying sizes, thus reducing the labour requirement to a minimum, and enabling pigs to fatten in the paddocks without resort to pen fattening, which creates more work.

Drinking water should always be available to pigs which are self-fed, as any limitation in their water supply will limit their food intake, and thus affect their growth rate.

Several sows with litters of approximately the same age can be run in the same paddock, provided they have a self-feeder of grain and a water supply to which the sucking pigs have access, as the self-feeder compensates for the robbing which occurs. When it is desired to wean the litters, the self-feeders should be hurdled off so that the suckers, but not the sows have access to them.

Wheat and barley are of somewhat similar feeding value; oats have a high feeding value only when they comprise not more than one-third of the grain mixture with wheat or barley. A mixture of grains is preferable to any one grain alone.

With straw available on wheat farms, shelter can be provided in the form of huts built of a wooden frame and roofed and walled with straw, the walls being wire-netting inside and out, with straw packed tightly between.

A space of 6 inches should be allowed between the top of the walls and the roof for ventilation. The roof should be about 6 feet above the floor.

Self-fed pigs tend to fatten at lighter weights than hand-fed pigs; therefore, care should be taken not to hold them until they become too fat to suit the market. To counteract this tendency towards early fattening, very long-bodied and large-boned pigs should be used, or, during the later part of the fattening period, more oats could be added to the diet to retard the pigs' growth rate, or the top of the lot may be taken off the feeder and hand-fed a limited ration.

Dry sows and boars should not be self-fed, as they generally become excessively fat.

In some wheat areas, marketing facilities for pigs are not good, but, with increasing production, this trouble should become less.

Self-fed pigs require less labour to rear.

DON'T Talk or Write about Troop Movements

SHEATH ROT IN SHEEP—continued from page 632.

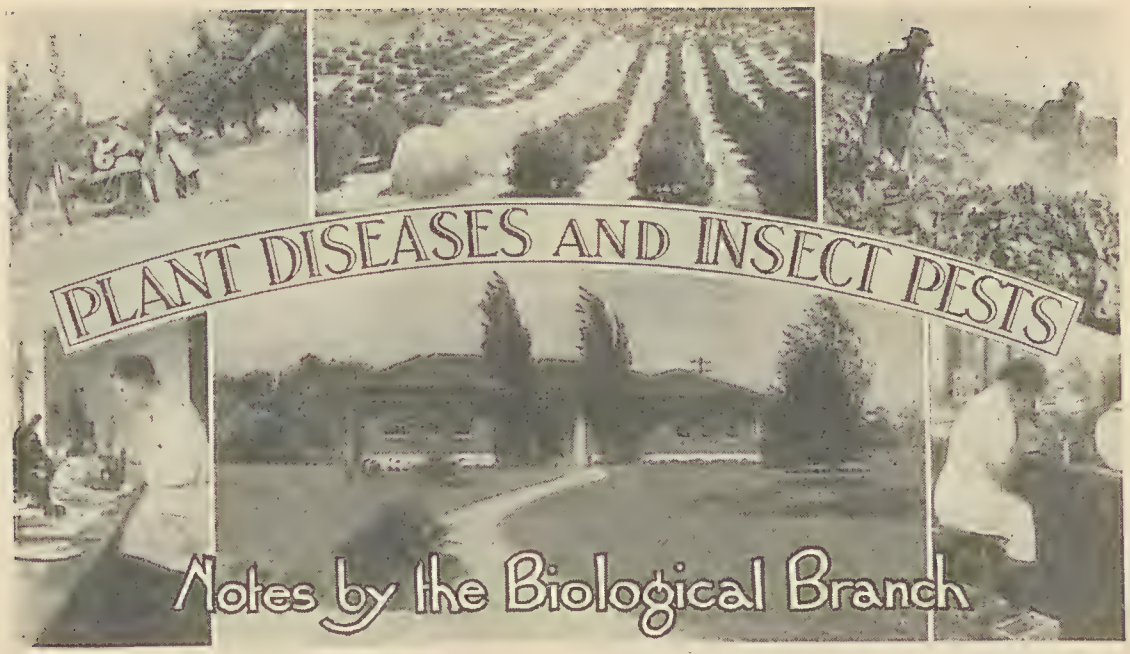
Discussion

An almost complete fast, for a period of nineteen days, during which the wethers had free access to bore water, had a remarkable effect in clearing up cases of sheath rot. In 69 of 87 cases, the internal lesions had completely cleared up, and the cases were regarded as completely cured. A further eleven cases would probably have cleared up after a few days' further treatment. Only four cases showed no signs of improvement. It is probable from investigations at Boatmen that, in spite of the fast, the urine in these four wethers remained alkaline throughout.

It is considered that the effect of the treatment on the general condition of the sheep was not severe. They certainly lost weight and appeared very hollow. The fast for practically three weeks caused no deaths, and, with the exception of a small percentage which were very poor in condition due to the effects of sheath rot, a large percentage were expected to fatten readily when given suitable feed. The question of relapse should be considered further, but from past experience in this district, it is believed that these wethers will not redevelop the trouble until feed conditions are "right" for development of sheath rot, probably in March next year if good summer rains are experienced.

The results of the experiment are of great practical importance. They reveal a very simple method of treatment available to the majority of graziers, and one which saves labour. It is suggested, however, that the fasting period should be limited to three weeks and at the end of this period those cases with blockage, or with a large quantity of pus in the sheath (in this instance 8 per cent.), should be treated surgically.

The method of food restriction may be varied somewhat, but the principle of the treatment is that very much restricted grazing with unlimited water should be allowed to wethers affected with all types of sheath rot for a period of three weeks.



PEACH RUST

BECAUSE peaches infected with rust are rendered unfit for canning purposes, growers are faced with a decision, at this period of the year, as to whether they should incur the expense of applying a peach cover spray of dry mix lime sulphur, in order to protect their fruit from this disease.

Peach rust, which is caused by a fungus (*Puccinia pruni spinosae*), occurs on the young leaves soon after unfolding in the spring. The source of infection is derived mostly from young twigs which have been infected in the previous autumn and do not break forth until favorable conditions occur in the spring. Once the rust is established on the young leaves and is producing mature spores, it is in a position to give rise to secondary leaf infections should favorable conditions occur.

Even under very favorable conditions for this disease in the Goulburn Valley the peach fruits are apparently not susceptible until December or later, so that it is only when summer rains fall on or after that period that fruit infection may occur. Apart from favorable conditions, a rust spore load from earlier leaf infections appears to be necessary for fruit infection. If there is no evidence of peach rust leaf infection from early spring until December, growers need not be concerned about applying a spray for the protection of their fruit. If, on the other hand, there is the slightest evidence of peach leaf rust infection, a spray should be applied in December to protect the fruit.

Experiments conducted by this Department have shown that dry mix lime sulphur applied at the rate of 25 lb. of the material to 100 gallons of water will prevent peach rust infection of the fruit, and with the late canning peaches a second application of the same spray may be necessary to prevent very late infection of the fruit.

Peach rust on fruit.

This dry mix lime sulphur is a very safe cover spray for peaches. It was first developed at the New Jersey Experiment Station, and consists of 16 lb. of dusting sulphur, 8 lb. of finely divided hydrated lime, and 1 lb. of lime casein spreader. These materials are thoroughly mixed together while dry, made into a paste, and then diluted to make 100 gallons of spray. A good agitator in the spray pump is necessary to maintain an even distribution of the material in the diluted spray.

If growers are in doubt as to whether their peach leaves are carrying rust infection, they may submit specimens for diagnosis to the Biologist, Biological Branch, Department of Agriculture, Plant Research Laboratory, Burnley, E.1.

PEACH LEAF CURL

While commercial fruit growers have long understood how to control peach leaf curl, the same cannot be said of home gardeners. Usually they display some interest in the curl and its control when it has disfigured their peach and nectarine trees, or perhaps the ornamental flowering peach trees, but they are disappointed when informed that it cannot be controlled once it has appeared and that measures for its prevention must be carried out in early spring. When spring comes, they either forget to spray at all, or do not spray at the right time with the necessary Bordeaux mixture spray.

Peach leaf curl which is caused by a fungus (*Taphrina deformans*) is characterized by thicker and broader leaves than normal, and the leaves become puckered, fleshy, stiff, and brightly coloured. The spores are borne in sacs on the surface of affected leaves and after expulsion are blown or splashed by the rain on to newly-forming buds, where they remain dormant until the following spring.

When cold wet conditions occur at the beginning of the growing period in the spring, the spores germinate and infect the leaves at a very early stage in their growth, and as such leaves develop they manifest the symptoms described above.

This disease can be completely controlled by spraying thoroughly with Bordeaux mixture at the right time, and that time is from bud movement to the first sign of pink in the bud. If the spray is applied later than the very early pink bud stage, the disease will not be controlled, because, by that time, the fungus has penetrated the young leaf tissue and is out of reach of the spray.

Typical symptoms of peach leaf curl.

Preparation of Bordeaux Mixture

The Bordeaux mixture used is known as Bordeaux 6.4.40. The first figure in the formula refers to the quantity of copper sulphate (bluestone) in pounds, the second figure to the amount of quicklime in pounds (if slaked lime is used half as much again is used—in this case 6 lb.), and the third figure to the amount of water in gallons.

If a small quantity of spray is required (e.g., 10 gallons), it is made up as follows:—

Dissolve 1½ lb. of copper sulphate (the small crystalline form dissolves more readily) in 5 gallons of water in a non-metallic vessel. In another vessel dissolve either 1½ lb. of slaked lime, or 1 lb. of quicklime, in another 5 gallons of water. Then mix the two solutions together by pouring them simultaneously into a third non-metallic vessel. The mixture, which should be sky-blue in colour, may then be put into a bucket pump, provided it is sprayed out immediately.

To prepare a large quantity (e.g., 80 gallons) dissolve 12 lb. of finely-crystalline copper sulphate in 72 gallons of water in a spray vat. Then mix 12 lb. of slaked lime with 8 gallons of water, start the agitators on the vat, and slowly pour the lime solution into the vat.

BLOSSOM END ROT OF TOMATOES

Tomato growers, both commercial and home gardeners, should guard against the spoiling of their tomato fruits with blossom end rot. This disease, which is a common occurrence on tomatoes, particularly in the northern districts of Victoria, is easily recognized by the large, sunken, putty-coloured to dark-brown patch at the blossom end of the fruit. This discoloured area extends deeply into the fruit and the affected tissue shrinks. Such fruit is unfit either for the fresh fruit market or for canning purposes.

This trouble is not parasitic in origin, but it is brought about by extreme variations in soil moisture. The plant need not droop from want of water, but the water lost from the leaves may be more than the roots can supply, and to meet the position water is drawn from the fruit. At a critical period in the growth of the fruit, such a loss of water results in a dead patch at the end of the fruit, which is known as Blossom End Rot. This condition can be prevented by making sure that the plants do not suffer from lack of water at any stage. Any practice which tends to maintain a fairly even soil moisture content, such as mulching, cultivation, and suitable frequency in applying water, will assist in controlling this condition.

Tomato affected with blossom end rot.

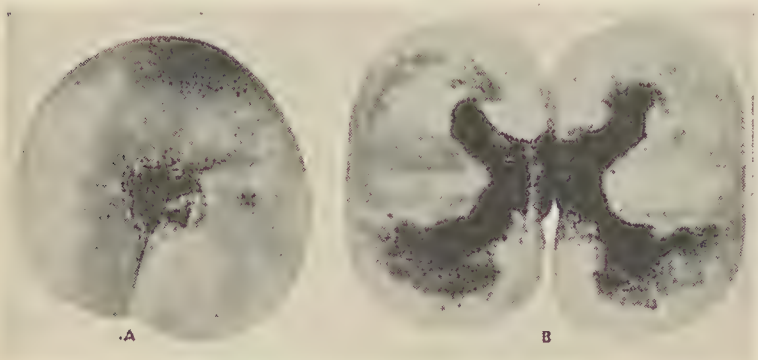
THE TOMATO MOTH

As losses of up to 50 per cent. of the tomato crop may occur from attacks by the tomato moth, *Heliothis armigera* Hb., unless adequate control measures are taken, it is essential for the national effort that such losses be prevented. In addition to tomatoes, sweet corn, maize, potatoes, flax, garden plants, and vegetables generally are attacked.

Nature of Injury

The caterpillars or grubs of the tomato moth usually enter at the stem end of the fruit, and, as a result, very little damage may be apparent from on outward examination. With the development of the grub inside the fruit, the fruit may either fall or show a development of "rot" around the point of entry. On cutting open an affected tomato, the interior will be seen to be partly eaten out, a black mass of excreta usually remaining. Very frequently, the one grub may travel from one tomato to another, until all the fruit in a bunch is destroyed.

Two other different kinds of injury also may be apparent. If the grubs of this insect attack the plant just at flowering time, they may so completely destroy the buds and flowers that no fruit is set. In addition, they have been known to attack the foliage, causing a similar type of damage to that caused by the common cutworm.



Tomato moth damage to tomatoes.
A—Advanced injury of the stem end with caterpillar in burrow.
B—Tomato cut in half to show internal damage caused by caterpillar.
[*After Essig & Michelbacher.*

Life History

The moths usually emerge from the overwintering cocoons in the soil from October to December. They measure roughly 1½ inches across the wings, are light-brown in colour, with brown margins on the hind wings. The eggs, which are laid on leaves or in places on or near the blossoms, are roundish and pale yellow in colour. They hatch in roughly four days, and the young grubs commence feeding at once, as

described above. They become fully grown in approximately three weeks and are then roughly 1½ inches in length, ranging in colour from pale green to dark-brown, and are heavily striped. There are two or three generations per year.

Control

Control of this pest on tomatoes can be accomplished either by spraying or dusting with arsenate of lead. On account of their ease of application, dusts are preferred to sprays by the majority of commercial growers.

Where dusts are applied, a 50 per cent. arsenate of lead dust, or where sprays are used, 2 oz. of arsenate of lead powder in 4 gallons of water, with or without spreader, will prove most satisfactory. Applications of either of these materials should be made at intervals of seven to ten days, the first application being made as soon as the first blossoms commence to set, dusting or spraying to continue for a period of six to eight weeks. If visible amounts of arsenic are to be seen on the fruit at picking time, the fruit must be either wiped or washed prior to marketing.

ANTS

At the present period of the year, ants are troublesome in houses, both in the city and in the country.

The Argentine ant—worker.
[Magnified 16·5 times.

While there are numerous kinds of ants which are encountered as pests, both inside and outside the house, their control can be considered under three distinct headings.

House Ants

The more commonly occurring ants in the home, such as the small black ant, but not including the Argentine ant which is, as far as we know, confined to certain areas around Melbourne, are usually referred to as house ants. The common house ants are permanently controlled only by the use of poison baits, made up as follows:—

Honey	.. ..	8 oz.
Water	.. ..	1 oz.
Sodium arsenite	..	12 grains.

To prepare this bait, the sodium arsenite is completely dissolved in the warm water, and then thoroughly mixed into the honey. The bait should be placed in small tins, such as tobacco tins, the lids of which should be kept closed and openings made in the sides for the entry of the ants. These tins are then set out wherever the ants are seen, preferably out of doors.

This bait is poisonous and should be kept out of the reach of children or irresponsible persons.

For temporary control, the liberal use of a pyrethrum fly spray where the ants are in the house and along their trails will prove most successful.

Argentine Ants

These brownish ants, more slender than the common black house ants, are only found in certain of the metropolitan districts around Melbourne.

They can be adequately controlled only by the use of a special poison bait, which should not be prepared by the householder himself, but purchased already made up. Details of the formula for making up this bait can be obtained on application to the Biologist, Biological Branch, Department of Agriculture, Burnley, E.1.

These poison baits should be put out in suitable containers of the type illustrated, and containing a small amount of wood wool or some such material, and then placed near the ants' trails. These containers should be distributed every yard or so, particularly near the foundations of buildings, and preferably in sheltered positions. The cans should be

refilled with the bait, if necessary, every four weeks. It is advisable to move the cans—if only a few feet—once a month for, when the ants become sick, they may not return to cans situated in the same place.

This bait also is poisonous and must be kept out of the way of irresponsible persons and out of the reach of young children.

Mound or Meat Ants

These large ants are most frequently encountered in the country areas, and on tennis courts, earth paths, and similar cleared areas. They commonly enter houses in the evening and night, and are strongly attracted to sweet materials, such as jams.

These ants are best controlled by the destruction of the nest under the mounds by the use of carbon bisulphide. One or two ounces of this liquid should be poured down each main opening of the nest, and the openings then covered over with moist earth or wet bags. After 24 hours the ants will be killed and the bags can be removed.

It must always be remembered that carbon bisulphide is inflammable and under certain conditions explosive and that no naked lights of any description must be present when it is being used.

A suitable poison bait container.

Tapeworms in Poultry

On poultry farms, and especially where the flocks have free range, birds are frequently seen to go light, to be stunted or slow growing. The development of two month old chickens may be arrested and pullets of 8 or 9 months may not have started to lay. Such birds appear depressed, have a capricious appetite and frequently suffer from diarrhoea. In these fluid droppings one may find tapeworm segments. There are sometimes symptoms of leg weakness.

A number of different species of tapeworm occur in the small bowel of fowls in this country and they vary, according to the species, from a fraction of an inch to several inches in length. In the life cycle of these worms, slugs and various insects such as flies, ants and grasshoppers act as the intermediate hosts. Such slugs and ants are picked up and digested by the fowls, the tapeworms are set free and the birds become infested. The life cycle is complete when segments of the worms pass with droppings to the ground where they are picked up by the intermediate hosts.

Diagnosis is made both on the symptoms described and on post mortem. In the small bowel one may find the tapeworms and also evidence of severe inflammation of the bowel.

Treatment by drugs is not entirely satisfactory but best results seem to be obtained by giving each bird Kamala or carbon tetrachloride contained in a capsule. Attempts also should be made to keep down the number of slugs and flies, &c., and also to keep the yards clean and free from droppings.

One point to remember is that tapeworms cause less trouble among birds kept housed under intensive conditions than those exercising on an open range. Such birds have less chance of picking up slugs, ants or grasshoppers and consequently are less likely to become infested.

Live Stock Notes

Compiled by
A. C. T. HEWITT, M.Agr.Sc.,
Live Stock Science Officer

Dairy Cattle

CALVES weaned this month should be turned out on to good pasture if they are not to receive a set back. It is recommended that calves should be bucket fed until they are between five and six months old, but, if good paddock feed is available, slightly younger calves down to four and a half months old, if well grown, may be weaned at this time of year to reduce work and to provide more skim milk for pigs that have to be topped off and sold before milk yields drop too low.

The best cows are those which have been well reared, and which have not received setbacks as calves and growing heifers. For this reason alone very much depends upon the way calves are reared and every effort should be made to grow them well.

Good meadow or lucerne hay is the best food to supplement pasture for growing stock. Concentrates are not necessary for calves over six months old when sufficient good roughage and pasturage are available. In fact, concentrates tend to fatten the animals rather than assist their growth, and, under Victorian conditions, where it is desirable to mate heifers at fifteen months old to calve at two years old, the heifers should be as well grown and developed as possible, and this is best achieved by feeding good meadow or lucerne hay as a supplement to pasture.

During their first autumn and winter, when the heifers are a year-off they should be fed up to 3 lb. of good grass hay per head daily for adequate growth, with average seasonal pasture. During the second autumn and winter when they should be springing, they should be fed up to 6 lb. of good pasture hay per head daily for normal growth and condition.

Normally, springing heifers should require the 6 lb. per day for not more than two months, and about 3 lb. per day for another two months. On this reckoning each springing heifer would require 3 cwt. of hay during the year, and each yearling heifer 1½ cwt. of hay, and these quantities could be taken as a minimum for young stock in working out a fodder conservation programme.

Beef Cattle

The reduction of price margins between choice highly finished prime beef and the heavy and plain sorts is becoming very pronounced. To some extent this has been brought about by abnormal conditions arising from the war, some of which are referred to hereunder:—

1. The heavy demand for canned meats by the fighting services.

2. Less home cooking due to the absence of a large number of people from their homes, on national service.

3. More people than usual dining at restaurants where large heavy roasts can be handled.

4. Whole families working and having hastily prepared meals at home from sausages, steaks, and purchased cooked meats.

Many of the changes in the habits of the people brought about during the last war remained and it is possible that many of the recent changes will be permanent also. Should this occur, it certainly will mean a far-reaching re-organization of the whole beef cattle industry.

Sheep

Flock matings will be delayed in very many of the late districts where shearing has not yet been completed. Although most of the Merinos have been shorn and mated, many of the Polwarths, Corriedales, and British breeds will not be ready to mate until shearing is completed this month.

All flock and stud sires should be in the right condition at mating time. If the rams are overfat, a common condition amongst some of the British breeds, they should be rested in the yards or sheds regularly for some weeks beforehand.

The feet of all stud and flock rams should be trimmed and otherwise attended to before mating, as sound feet are a necessity for an active ram.

It is poor economy to stint the percentage of rams in the breeding flock, particularly in a season like the present, when the rams are likely to be below par on account of excessive fatness or bad feet.

The nine pigs illustrated are from a litter of twelve which, at eight weeks old, weighed 526 lb.

One should not jeopardise a good lambing percentage for the want of a few extra flock rams. The quality of the rams should also be taken into account and the extra one or two guineas paid per head for better rams is of small account compared with the large number of better quality lambs sired by the rams during their several years of service.

[N. A. Bowman, Sheep and Wool Expert.]

Pigs

The nine pigs illustrated on this page have a performance record which should be an inspiration to pig raisers. They are portion of a litter of twelve which at eight weeks old weighed 526 lb. At that stage of their growth reference was made to the pigs in these notes, in the September issue of the *Journal*.

After weaning, three selected boars from the litter were sold for stud breeding, and the remainder of the litter were carried on with access to a self feeder containing crushed barley and wheat, with meatmeal, lime, and salt added, and fed a little separated milk and green food as well.

The photograph was taken when the pigs were 151 days old, at which age the three barrow pigs were taken for slaughter.

The three pigs slaughtered included the heaviest and the lightest, as well as one of approximately the average weight of the litter. The carcass weights of these three pigs were 180 lb., 116 lb., and 148 lb. respectively. The estimated average dressed weight of the litter at 151 days old was, therefore, nearly 150 lb.

The carcasses of the three pigs were graded choicest by the bacon company.

The factors contributing to this outstanding performance of prolificacy, fast growth, and carcass quality, are the large size and body length of the sire and the dam, both of which are Large Whites, the liberal feeding of the sow throughout pregnancy and lactation, and the self-feeding of the pigs from the time they were three weeks old.

[L. A. Downey, H.D.A., Pig Expert.]

Poultry

Special care should be given to the birds during the summer months, to avoid undue loss from the effects of heat and to maintain high egg production.

There are various means of reducing mortality in the flock during a heat wave. Generally, best results are achieved by spraying the litter, the walls of the houses, and the birds with water at frequent intervals during the hottest part of the day. Ample room should be provided in the laying houses, as overcrowding causes the birds to become overheated. A house 20 feet square, 8 feet high in the front, and 6 feet high at the back, with a 6-in. opening along the back under the roof, will allow good ventilation, and provide sufficient room for 100 birds. A constant movement of the air is important. Plenty of nests inside the houses are essential, and they should be well ventilated, so that the birds will be as cool as possible while laying.

A suitable combination of clean and wholesome foods, sufficient for the birds' requirements, is essential to maintain vigour. Birds should not have access to any unclean or decomposing foods, as these greatly interfere with their health, especially during the hot weather. The birds should be provided with a continuous daily supply of greenstuffs and a constant, plentiful, and easily accessible supply of fresh, cool drinking water. Water vessels easily reached by the birds under normal weather conditions are sometimes difficult to reach when the birds become distressed with the heat. Water vessels placed temporarily on the floor of the pens, and as near as possible to the birds, are of great advantage in hot weather.

Good birds, kept under healthful conditions and well fed, maintain a high standard of health and natural resistance to varying weather conditions.

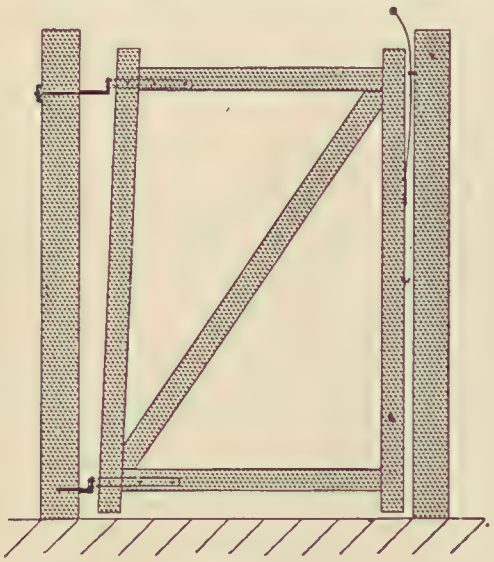
Eggs should be collected at least twice a day, and packed when cool in clean fillers and flats. They must be placed in the fillers with the large ends up, and no packing material, such as chaff, should be used. They should be kept in a cool place, and marketed at least twice weekly during the warmer periods of the year.

Eggs to be marketed should not be subjected to any process of cleaning. These clean, unsoiled eggs should be sorted out from the soiled eggs and packed for market.

[H. F. Clinton, Poultry Expert.]

A Self-closing Gate

Gates are so frequently left open, due to faulty closing devices, that a simply constructed self closing type of gate not dependent on pulleys or springs for its operation should be found valuable. The gate may be constructed



Self-closing gate.

by making the frame 4 inches narrower at the top than at the bottom. By projecting the top hinge 4 inches further out from the post than the lower hinge, as shown in the diagram, the gate, when opened, is raised slightly, and swings shut under its own weight. With suitable hinges, the gate may be opened both ways, and it will shut automatically. A spring catch will secure it from being pushed open by stock.

Bees

Swarming should cause little trouble from now on, and preparations for the coming season should be well in hand.

Colonies that have swarmed should receive special attention. Under normal conditions evidence of a young laying queen is shown within three weeks after swarming, but, unfortunately, a percentage of young queens fail to return to the hive after the mating flight. To prevent the total loss of such a colony, assistance must be given, either by the introduction of a young laying queen taken from stock kept for the purpose, or by transferring to the hive a brood frame containing young larvae and eggs from a selected colony, and thereby providing the bees with the means of raising a new queen.

White and strawberry clovers are in bloom in the south-western and south Gippsland districts. The yield from clover is usually light, averaging about 30 lb. of surplus honey per hive, and with few exceptions, apiarists depending on clover as a source of nectar are associated with other branches of farming.

In the Central and Grampian districts, yellow box is blooming and in some parts there are good prospects from red gum. In the North-east and Goulburn Valley areas a fair yield from red gum is expected.

Bountiful rains have been responsible for a strong growth appearing in the tops of the grey box, and while it is yet too early for a definite forecast, present indications suggest a heavy autumn flow.

[J. W. Thomlinson, Apiary Inspector.]

VETERINARY NOTES

Sheep Blowfly Control

Following research work by the Council for Scientific and Industrial Research, considerable advances have been made in the control of trouble caused by sheep blowflies. Crutch strike can be greatly reduced by the use of the Mules operation and by docking the lambs correctly.

The Mules Operation.

The Mules operation consists of the removal of the medial crutch folds from ewes (or wethers) where necessary. As about 90 per cent. of fly strikes in sheep commence on this area, this operation is of great value in the reduction of strike incidence.

The operation is performed with an ordinary pair of dagging shears. A strip of skin which includes the medial fold is removed, starting from the side of the butt of the tail running down some inches below the bottom of the vulva.

Keep the shears clean.

No dressing need be applied to the wounds.

Sheep of any age can be treated, but it is better to operate as young as possible.

Marking time and weaning time are most suitable, if at the latter time crutching will be necessary. The shorter the wool the easier the operation.

Operate at any time as the wounds are not very attractive to blowflies. If the small bush fly (*M. ventutissima*) is abundant, however, postpone the operation.

Practised operators can do 100-120 weaners or lambs per hour.

The protection given by Mules operation is high.

Mules operation facilitates crutching and jetting and, together with long tailing, it should form the basis of all fly control campaigns, as they reduce susceptibility to a permanent low level at which the application of crutching and/or jetting will eliminate about 90 per cent. of the graziers' fly trouble.

Tail Marking.

It has been found that tails cut short render a sheep more subject to strike than those with longer tails. It has been demonstrated that the best length to dock ewe lambs is so that the tail extended below the tip of the vulva, i.e., cut off through the third or fourth joint.

Observations made over a period of thirteen months at Dungalear, New South Wales, showed that the percentage of strike was as follows:—

	Per cent.
Long tails	4.8
Medium tails ..	10.7
Short tails	17.9

Similar percentages were recorded in observations made at Gilruth Plains, Queensland.

It has been consistently shown that short-tailed sheep are more susceptible to crutch and tail strike, and that the control of crutch and tail strike starts at marking time.

Bad marking will increase the susceptibility of sheep for life.

[W. D. Shew, G.M.V.C., B.V.Sc., Senior Veterinary Officer.]

Shelter Trees Around an Orchard

In most parts of Victoria where fruit is grown the provision of shelter from wind is an important factor in the production of first quality fruit. It is easier to grow good fruit on poor soil with shelter than on rich soil without it.

In many places it may be possible to leave belts of native timber, but where this is impracticable, a row of rapidly growing trees should be planted. The variety of tree chosen will depend on the district in which it is to be planted.

Pinus insignis and the *Lambertiana* cypress are probably the most suitable trees to use in the cooler areas, and a single row of either will give excellent shelter. The Pittosporum is another hardy tree which could be used, especially for intermediate breaks to divide a large area. Of these trees, the pine and Pittosporum may be easily raised from seed, but the true *Lambertiana* should be obtained from a reliable nurseryman.

In the northern citrus areas it is important that the tree selected is not a host for red scale. One of the most suitable is the Boobialla, which is extremely hardy and will give good dense shelter up to a height of thirty feet. Sugar gums are useful provided they are lopped to force out growth near the ground. Both these trees may be easily propagated, the Boobialla by cuttings and the eucalypt from seed.

After deciding on the trees to be used it is necessary to plan the windbreaks to give maximum protection, while not entirely closing in the orchard or grove, thus preventing normal air drainage. If this occurs, losses of fruit from frost, fungus diseases or sunburn are liable to be suffered.

It is necessary to leave a headland of thirty to forty feet between the breakwinds and the first rows of fruit trees to avoid root interference. The ideal is to establish the breakwind before the orchard, but if the fruit trees are already planted, do not let this deter you from starting your shelter trees this year.

In the Garden

By J. L. PROVAN, B.Agr.Sc., Principal, School of Horticulture, Burnley

Dahlias

THE period, late November to early December, is the best time to plant dahlias, and if the enthusiasm exhibited by suburban gardeners during last summer and autumn is any indication, the beds this summer will be almost as bright as usual.

Early planting undoubtedly extends the flowering season of the dahlia, but the flowers produced during the hottest days of summer do not last long. They quickly lose their colour and may be burned by the hot sun. The late summer and autumn flowers produced from the late November and early December plantings are generally superior in all ways to those from earlier plantings.

Soil Preparation.

The dahlia is a gross feeder and requires well prepared soil. Well-rooted stable manure or compost should be dug into the beds and 3 to 4 oz. per square yard of blood and bone manure applied. Water the beds thoroughly a few days before planting.

Apart from seedlings which do not come true to the parent, dahlias are usually planted as green plants or as tubers. Both are quite satisfactory, although the green plant, which has been raised by the nurseryman from a tip cutting and sold as a pot plant, requires a little more careful handling at planting time.

Green Plants.

Before setting out green plants the pot should be soaked with water and allowed to drain. Then the plant and soil can be knocked out of the pot without the soil falling away from the roots. This is done by placing the fingers of one hand over the soil in the pot, with the young dahlia plant standing between the fingers. The pot is then inverted and the rim is knocked sharply on a solid object to dislodge plant and soil in one lump into the hand. In this way the roots of the young plant are not disturbed.

Prior to knocking out, the pot may be pressed deeply into a small hole in the loose soil at the base of the stake where the young dahlia is to be planted. When knocked out, this hole will receive the soil and plant with a minimum of disturbance. Label the plant, and water to settle the soil. A light shading from some leafy twigs for a few days will be helpful. If the plant is more than about 4 inches in height, it is advisable to tie it lightly to the stake.

Staking.

The height of the stake is important if the beds are to have a neat, orderly appearance. A jarrah stake should be driven 12 to 18 inches into the soil—depending on the soil type—and should be tall enough to be just below the top of the mature dahlia. There is no need to have the unsightly ends of the stakes protruding above the plants. Ascertain beforehand the approximate heights of the new varieties and arrange the stakes accordingly. Very heavy stakes are unnecessary; 1 in. x 1 in. will be found satisfactory. Soil preparation and staking should always precede planting. Space the stakes 3 feet apart.

Planting of Tubers.

If a clump of dahlia tubers is examined, it will be found that each tuber is attached to the thickened basal end of the stem. Before replanting, it is usual to break and cut the clump so that individual tubers can be planted. If shoots are present, these should be cut back to the basal buds before the clump is broken. Sometimes the old stem produces buds which later grow into dahlia plants.

In the spring, on the stem end of many dahlia tubers, small buds or young shoots will be found. Unless a bud or young shoot is apparent, the tuber should not be planted, but may be placed in a warm, moist spot and just covered with soil in the hope that a bud will make its appearance. Sometimes no shoot appears, and this tuber must then be discarded.

Plant the tuber about 4 inches deep with the bud, or cut-off shoot, near the stake and then cover with soil. Do not water until the young shoot appears above the surface.

IN THE VEGETABLE GARDEN

Peas

Peas are always popular in the home garden, and in cool districts another sowing can be made this month. The most suitable warm weather variety is *Yorkshire Hero.* Sow the seed in drills about 18 inches apart with 2 inches between the plants. Cover the seed to a depth of about 2 inches.

Cabbages

Plants of *Early Jersey Wakefield* and *Succession* varieties of cabbage may be put out this month. Generous manurial applications are essential for good cabbage production. Before planting, dig in a large amount of well-rotted manure or compost and apply at least 2 oz. per square yard of blood and bone manure. In poorer soils this latter fertilizer can be increased to 4 oz. per square yard. Space the plants 2 feet to 2 ft. 6 in. apart in rows about 2 ft. 6 in. apart.

Seed of *Drumhead, Allhead,* and *Enkhuizen Glory* cabbages may be sown in seed-beds which are provided with a light shade until the plants are well established. This light shade can be obtained from bamboos, light hessian, or prunings from trees or shrubs placed on a wire frame or on wire netting. From one quarter to one half an inch of soil over the seeds is sufficient.

Plants in seed-beds, as well as those just planted out, must be regularly protected from the cabbage moth and the cabbage white butterfly by spraying with arsenate of lead, 1 oz. of paste per gallon of water, or dusting with an arsenate of lead dust. The treatment should be repeated every ten to fourteen days.

Potatoes

At flowering time the potato plants should be hilled. The best kind of hill is rather flat-topped and wide. This is better than the higher and sharper ridged hills frequently seen in vegetable gardens. The broad hill gives plenty of soil cover for the potatoes which are formed at the far end of the underground stems. Hilling prevents sunburn of the tubers and also reduces the damage caused by the potato moth. Immature potato tubers, exposed to the light, turn green. This can also be prevented by correct hilling.

If space and seed potatoes are available, it is not too late to make another planting. For this planting, choose one of the late varieties like *Up-To-Date, Carman No.* 3, or *Snowflake.* Plant in rows 2 feet apart and 16 inches between the plants and cover the seed to a depth of 4 to 5 inches.

Runner Beans

Walls and fences with a sunny aspect can be utilized to produce vegetables by planting runner beans along them. Some extra support for the plants will be necessary and this can be provided by stakes, old wire netting, wire, or even binder twine. *Epicure, General McKay, Kentucky Wonder,* and *Scarlet Runner* are popular varieties, and late sowings of these will generally give good results. Space the plants 8 to 9 inches apart.

Cauliflowers

Seed of *Early Epicure* cauliflower may be sown now in a properly prepared seed bed. Mix some old, dry, stable manure with the soil to be used for covering the seed, and sieve this over the seed-bed so that the seed is covered to a depth of about half an inch. Light shading, similar to that recommended for the cabbage seed-bed, will be found an advantage in the hot weather. Do not sow the seed too thickly and reduce the amount of shading as the young seedlings develop, otherwise tall, weak plants will result. Such plants do not transplant well during the summer. Aim at producing hardy seedlings.

Carrots

Summer sowings of carrots are usually very successful in the home garden. They should be sown in beds which have grown a heavily manured crop previously. Do not add stable

manure or compost to the soil just prior to sowing the seed, because this has a tendency to produce forked roots. Sow the seed in drills 15 to 18 inches apart and cover to a depth of half an inch. *Manchester Table, Danver's Half Long, Short Horn,* and *Chantenay* are good varieties from which to make a selection.

Tomatoes

Many home gardeners become confused by the numerous tomato varieties and their cultural requirements, particularly as to pruning and staking. There are three main types of tomato being grown at present, viz., "Crinkled," "Globe," and "Cluster." Of the crinkled types, the best known varieties are *Burwood Wonder, Orange Prolific, Australian Large Red,* and *Mortgage Lifter.* These varieties are usually grown in bush form (not staked) and are left unpruned.

The best known varieties of Globe tomatoes are *Eccle's Surprise, Break-o-Day, Earliana,* and *Red Marhio.* These varieties do best when grown on stakes and trained to two or three leaders. When these two or three main growths develop all lateral shoots arising in the axils of the leaves are pinched out as soon as they appear and only the one growing point on each leader is allowed to remain. In rich soil, *Eccle's Surprise* may be trained to four or five leaders.

Cluster types such as *Salad's Special, Guernsey Beauty, Kondine Red, Recruit,* and *Sensation* are trained to a single leader and staked. When the plants are growing vigorously, it is necessary to inspect them every few days and remove the young growths appearing in the leaf axils, retaining only one growing point at the top of the plant. If the fruit of any of these varieties is too small, then the tips of the clusters should be removed.

In the Orchard

By G. W. GAYFORD, B.Agr.Sc., Assistant Horticultural Research Officer.

Irrigating Citrus Trees

THIS time last year large numbers of trees in the northern irrigation areas had lost most of their leaves, and growers were much concerned about the health and production capacity of their groves. Although several contributing factors were observed as causes of the trouble, the chief reason seemed to be the unusually dry winter and subsequent concentration of salt in the root zone.

The past season has been a favorable one in northern areas where adequate winter rains have fallen. However, citrus growers on soil subject to salt troubles are advised that irrigation methods should be adopted which will prevent the uneven distribution of salt with high concentrations in the root zone. It has been shown that the spray irrigation system is definitely the best. The equipment for this method is costly to install, and such capital expenditure is hardly justified at the present time, so that the next best methods, i.e., flood or multi furrow irrigation should be used in order to achieve uniform watering of the planted area. In some instances the length of run may be shortened with advantage, especially on lighter soil types where there is a danger of over-watering the top section of a lengthy run. Generally speaking, on soils of this type, the run should be limited to 3 to 4 chains. The depth of penetration along the length of the run can be determined by using a soil auger. To allow the soil to dry out to wilting point results in damage to the trees and dropping of the fruit, so that the auger should be used also to determine the time of application of water.

The Apple Crop

In some districts apple growers have practically no crop. There is no satisfactory explanation for the failure of many trees to blossom. Some nutritional trouble must have occurred at the normal time for blossom bud initiation last December and January. The heavy rain in May caused the leaf buds to swell to such an extent that they looked like blossom buds, and consequently, many growers anticipated large crops, but when the trees blossomed, the flowers appeared to be weak and low in pollen. This, together with a severe thrips infestation in some areas will result in a very light crop. In fact, many growers say that it will be scarcely worth while spraying. Where this decision is made it is well to strike a note of warning. A few fruits left on the tree will serve as a breeding ground for codling moth and therefore the best policy would be to go over the trees immediately, removing the few remaining fruits. More time can then be devoted to pest control in the sections of the orchard which are in bearing.

JAM MAKING

By the Fruit Preserving Expert

JAMS are made by boiling fruit and sugar together until a jelly-like set or a stiff consistency is obtained. Fresh fruit, pulp, dried fruit, or preserved fruit can be used for jam. If using fresh fruit, make up as soon as possible after picking.

To test for the finishing point of jam, use one of the following methods:—

Place a teaspoonful of jam on a cold plate and cool. If it crinkles when pushed with a spoon the jam is done.

Dip in spoon, turn in hand to let jam cool, then let it drip from the edge. If it breaks off in flakes the jam is done.

Covering Jams.

1. Pour a thin film of paraffin wax on to the jam, cover with screw lid, paste paper over, or cover with cellophane.

2. Cut piece of paper to fit the top of the jam, dip in vinegar, place on surface of the jam. Cover with lid or paste paper over.

Spoiled Jams.

Moulds and yeasts are minute plant forms found in the air. They are destroyed by boiling the jam. If jam is bottled hot into warm bottles, and if the sealing is efficient, no air can enter and yeasts and moulds will be excluded. Moulds sometimes grow on the surface of jam that has not been properly sealed. Yeasts cause fermentation which creates gas bubbles in jam which may lift the seal.

If there is an excess of sugar in a jam due to adding too much or cooking too long, crystals may appear.

Fermented jam should be thrown out. With mouldy jam remove mould and top jam. Crystallized jam should be reboiled with water added.

In the home it is better to make small rather than large quantities of fruit into jam, not more than 8 or 10 lb. at a time, preferably about 4 lb. There are three main methods of making jam.

FIRST METHOD.

Cook fruit slowly with a little or no water until tender. Add the sugar and dissolve (¾ lb. to 1 lb. sugar to 1 lb. fruit). Boil rapidly until the test is taken. The following jams are made by this method:—

Apple Ginger.—6 lb. cooking apples, 4½ lb. sugar, ¼ lb. whole ginger.

Peel core, and slice apples. Cover peelings and cores with water, simmer half an hour, and then strain. Add strained liquid to prepared apples and bruised ginger (the latter tied in muslin) and simmer about 1½ hours. Add sugar and cook to a good consistency.

Apple Marmalade.—6 lb. apples, 9 lb. sugar, 6-9 lemons, 6 pints water.

Slice lemons thinly, soak overnight in the 6 pints boiling water. Next day cook until rinds are tender, then add prepared apple. Cook until tender, add sugar and cook quickly until test is taken.

Apple and Orange.—4 lb. apples, 4 oranges (sweet), 3 lb. sugar.

Peel and slice apples, grate orange rind, and squeeze juice and add.

Apricot Jam.—4 lb. apricots, 4 lb. sugar, ¾ pint water, juice of 2 lemons.

Kernels from some apricot stones may be blanched and added.

Blackberry Jam.—3 lb. berries, 3 lb. sugar, juice of 3 lemons, ½ pint water.

Blackberry and Apple.—6 lb. blackberries, 2 lb. apples, 8 lb. sugar, juice of 2 lemons.

Prepare apples and cook in a little water until tender, add blackberries, and continue according to first method.

Black Currant.—4 lb. black currants, 5 lb. sugar, 2 pints water.

Carrot Marmalade.—3 carrots (medium), 4 lemons, 2 lb. sugar, 2 pints water.

Grate carrots, slice lemons, cover with the water, and stand overnight.

Cherry Plum and Pineapple.—6 lb. plums, 1 pineapple, 4½ lb. sugar, ½ pint water.

Dried Apricot.—1 lb. dried apricots, 4 lb. sugar, 1 oz. almonds, 2 quarts water.

Cover apricots with boiling water in which a teaspoonful of bicarbonate of soda has been dissolved. Soak half an hour, rub off dust, rinse, add 2 quarts water; soak 24 hours, add almonds and proceed as for first method.

Dried Apricot and Pineapple.—2 lb. apricots, 1 large pineapple, 7 lb. sugar, 2 quarts water.

Make as for dried apricot, pineapple sliced or grated and added.

Dried Peach.—1 lb. dried peaches, 4½ lb. sugar, 2 lemons (juice), 2 quarts water.

Make as for dried apricot.

Fig Jam.—½ lb. preserved ginger, 6 lb. firm figs, 1 pint water, ½ pint vinegar or 3 lemons, 6 lb. sugar.

Stem fruit. Skin if desired by scalding in boiling water and rubbing. Slice figs, slice lemons thinly.

Gooseberry Jam.—6 lb. gooseberries (green), 8 lb. sugar, 2 pints water.

Top and tail gooseberries, boil with water until colour is given.

Grape Jam.—6 lb. grapes (at least half under ripe), 3 lb. sugar. Remove stalks, press pulp, boil until tender, run through a colander to remove seeds.

Loganberry Jam.—4 lb. sugar, 4 lb. loganberries, boil 5-10 minutes. Squash fruit, bring to the boil, add sugar, boil 5 to 8 minutes.

Peach Jam.—6 lb. peaches, juice of 3 lemons, ½ pint water, 4 lb. sugar.

Cut peaches into eighths and weigh. Cook with lemon juice and water until excess water has evaporated and the fruit is tender.

Pear and Apple.—2 oz. whole ginger, 4 lb. pears, 1 tablespoonful cinnamon, 4 lb. apples, 8 lb. sugar, ¾ pint water.

Pound ginger, and simmer with cinnamon, reducing to about ½ pint. Add prepared apples and pears and proceed as for first method.

Plum Jam.—6 lb. plums, 5 lb. sugar, 1 pint water.

Cook plums with water until the fruit is well broken up. Jam may then be strained through colander to remove the stones, or the sugar added and the stones skimmed off as they rise to the top.

Plum Combinations—

Plum and peach.—Equal quantities of plums and peaches, make as for plum.

Plum (dark) and mulberry.—2 lb. mulberries, 3 lb. plums, 4 lb. sugar, ½ pint water. Cook plums first, then add mulberries, Make as for plum jam.

Plum (cherry and gooseberry).—2 lb. gooseberries, 3 lb. plums, 5 lb. sugar, ¾ pint water. Make as for plum.

Plum (cherry) and loganberry.—3 lb. loganberries, 3 lb. plums, ½ lb. sugar, ½ pint water. Cook plums, then add loganberries. Make as for plum jam.

Plum and pineapple.—See Cherry Plum and Pineapple.

Plum (dark) and raspberry.—Make as for plum and mulberry.

Quince Jam.—4 lb. quinces, 3 lb. sugar.

Peel, core, and cut up fruit. Cover with water and cook until tender and pink in colour.

Quince and Ripe Tomato (Mock Raspberry).—3 lb. quinces, 4 lb. sugar, 2 lb. ripe tomatoes, 1 pint water.

Prepare quinces. Pour boiling water over tomatoes and skin. Simmer fruit 1½ hours.

Raspberry Jam.—4 lb. raspberries, 4 lb. sugar.

Squash fruit and bring to the boil, add sugar, dissolve, boil 5 minutes.

Raspberry and Red Currant.—2 lb. red currants, 4 lb. raspberries, 6 lb. sugar.

Stem currants, crush and bring to the boil. Boil 10 minutes, then add raspberries.

SECOND METHOD.

The fruit is cut up, half the sugar is sprinkled on, then it is allowed to stand overnight to draw the juice. Next day it is boiled slowly until the fruit is quite tender. The remainder of the sugar is then added, dissolved, and the mixture boiled rapidly until the test is given.

Jams made by this method are as follow:—

Melon and Apple Jam.—6 lb. melon, 6 lb. sugar, 6 sour apples, 2 lemons.

Dice melon and stand overnight with half the sugar. Next morning add cut-up apple and sliced lemon.

Melon and Ginger Jam.—6 lb. melon, ¼ lb. green ginger, 4½ lb. sugar, 3 or 4 small bird's eye chillies.

Add scraped green ginger, finely cut, when putting jam on to boil.

Melon and Grapefruit.—8 lb. melon, ½ lb. grapefruit, 6 lb. sugar, 1½ pints water.

Grapefruit, finely cut, is added when jam put on to boil.

Melon and Lemon.—6 lb. melon, 2 lemons, 4½ lb. sugar.

Shred lemon finely, and add when jam is put on to boil.

Melon and Seville Orange.—6 lb. melon, ½ lb. Seville orange, 2 pints water, 6 lb. sugar.

Shred orange finely, and put on with melon to boil.

Peach and Pineapple Chips.—6 lb. prepared peaches, 2 lb. pineapple, 6 lb. sugar.

Cut peaches into pieces and cover with half the sugar, stand over night. Next day add prepared pineapple.

THIRD METHOD.

Conserves.

A syrup of sugar and water is made—about 1 pint water to 6 lb. sugar. When boiling, the prepared fruit is added and cooked until the test is given. In a conserve the fruit remains whole or in large pieces, and does not mash up.

Loganberry Conserve.—6 lb. loganberries, 6 lb. sugar, 2 pints water.

Make up as for conserve method.

Pear Ginger.—4 lb. pears, 3 lb. sugar, 1 lb. preserved ginger, 3 tablespoonsful vinegar, grated rind of 2 lemons (yellow part), 1 quart water.

Make a syrup of vinegar, sugar, and water, and boil 5 minutes. Pour over prepared fruit, lemon rind, and cut-up ginger. Stand over night. Simmer slowly for about 2 hours.

Buy a £10 National Savings Bond

Feeding Oats to Horses.

Generally speaking, oats are the best and easiest grain to feed to horses. They are easily digested, well balanced as regards nutriment, and with reasonable care, can be fed in large amounts without ill effects.

Oats can be fed whole, but as horses with defective teeth are inclined to swallow the grain without proper chewing, it is a decided advantage to crush them first. The husk should be merely split and not actually crushed.

The quantity of oats given daily depends on the amount of work being performed and also on the amount of other food consumed either as chaff or by grazing.

On many properties oats are fed in the form of oaten chaff without any extra ration of the grain itself. This is quite alright in many cases, but owners should realize that when regular hard work is being carried out an extra oat ration is necessary to maintain the horses in good condition.

Medium draught horses doing moderate work require, apart from their chaff ration, about 6 lb. of oats, and on heavy work up to 12 lb., while heavy draught horses require from 8 to 14 lb. daily.

The *actual* amount fed should be judged on the condition of the animals, and should be varied according to whether condition is being held, lost, or gained.

Tubercle-free Herds

Accredited Tubercle-free Herds.

The following herds have been declared free of tuberculosis under the *Accredited Tubercle-free Herd Scheme* conducted by the Department of Agriculture. Under this scheme a tubercle-free accredited herd of cattle is one in which the entire herd has passed two negative, successive, annual physical examinations and tuberculin tests, or upon disclosure of infection, three semi-annual, successive physical examinations and tuberculin tests applied by a State Veterinarian or by a qualified and registered veterinarian who is approved by the Chief Veterinary Inspector for that purpose.

Name.	Address.	Number in Herd.	Name.	Address.	Number in Herd.
Ballarat Mental Hosp.	Ballarat	69	Longerenong Agricultural College	Dooen	43
Banyule Stud Pty. Ltd.	Wangaratta ..	42	McNabb and Son, G. A.	Irrewillipe East ..	177
Black, I. S., Estate ..	Mount Noorat ..	52	Onley, W. H. ..	"Glenholme," Caldermeade	50
Clarke, A. B. ..	Glenormiston South	16			
Dennis, Mrs. A. A. ..	Frankston	33	Payne, A. E. T. ..	"Yarra View," Lilydale	63
Dookie Agricultural College	Dookie	77	Payne, T. E. N. ..	"Woodburn," Kilmore	46
Dunbar and Clark, Messrs.	"Hazeldean Dairy," Mount Dandenong	18	Powell, T. S. ..	"Carellen," Mansfield	46
Geelong Grammar School	Corio	56	Richardson Bros., Messrs.	"Faldinghurst," Upper Beaconsfield	36
Gibson, Mrs. C. S. ..	"Sweeney's" Eltham	29	Samuel, Misses G. and E.	Lang Lang ..	48
Gorman, A. W. ..	"Cathcart," Alexandra	61	School of Horticulture	Burnley	9
Holloway, R. W. ..	Caldermeade ..	72	State Experiment Farm	Rutherglen ..	40
Kilmany Park Farm Home for Boys	Sale	94	State Research Farm	Werribee	229
Lawrence, P. H. ..	"Rainga," Tarrawarra	72	Wells, W. G. ..	Caldermeade ..	65

In addition to the above-mentioned, the herds set out hereunder may be considered free of tuberculosis. All these herds have given negative reactions to two or more successive tests conducted by departmental veterinary officers, but inasmuch as replacement cows are only submitted to one test before being admitted to the herds, they cannot be considered as accredited under the accreditation scheme which requires, among other things, that no cow shall be admitted to the herds unless it has given two (2) negative reactions at an interval of 60 days, and must be kept in isolation during the period between the two tests.

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Andison, J. A. ..	Thomastown ..	43	Child, G. P. ..	Epping	53
Andrew, J. C. ..	Whittlesea ..	121	Christian Bros. ..	Doreen	41
Andrew, W. ..	Whittlesea ..	160	Clark, P. W. ..	Whittlesea ..	62
Andrews, E. H. ..	Templestowe ..	19	Clements, M. and L., and Son	Bundoora	135
Balharrie, J. A. ..	Whittlesea North ..	59	Cobain, J.	Thomastown ..	40
Barclay, A. H. ..	Whittlesea ..	107	Collins, L.	Doreen	74
Barling, J. ..	Mernda	39	Cornfoot, D. H. ..	Whittlesea ..	25
Batten, R. J. ..	Wollert	44	Cotchin, J. ..	Woodstock ..	18
Bebbington, J. ..	Whittlesea ..	92	Coulthard, J. J. ..	Whittlesea ..	66
Benson, R. ..	South Morang ..	28	Craker, Mrs. E. ..	Warrandyte ..	2
Bodycoat, A. ..	Wollert	39	Cumming, H. R. ..	South Morang ..	20
Booth, Mrs. A. ..	Warrandyte ..	8	Cunningham, E. C. ..	Templestowe ..	23
Bourke, G. J. ..	Fairfield	82	Danaher, J. V. ..	Whittlesea ..	63
Bradbury, A. K. ..	Diamond Creek ..	31	Danns, N. C. ..	Whittlesea ..	34
Buckley, F. J. ..	Mernda	104	Dennett, C. A. ..	Cragieburn ..	38
Bunting, J. ..	Epping	35	Deutscher, H. W. ..	Mernda	168
Butler, W. ..	Wallan	49	Deveny, M. ..	Bundoora	51
Callaghan, L. ..	Epping	34	Draper, L. S. ..	Wollert	31
Callaghan, T. F. ..	Thomastown ..	40			
Carr, W. J. ..	Wollert	65			

TUBERCLE-FREE HERDS—*continued.*

Name.	Address.	Number in Herd at Last Test.	Name.	Address.	Number in Herd at Last Test.
Drysdale, J. C.	Warrandyte	41	Miller, A. J.	Whittlesea North	47
Evans, Miss M.	Bundoora	29	Miller Bros.	Greensborough	36
Fellows Bros.	West Heidelberg	52	Mosig, H. C.	Epping	26
Fergusson, M. A.	Whittlesea	92	Nalder, H. S.	Epping	20
Fitzsimons, B.	Lower Templestowe	33	Nash, H. A.	Tullamarine	41
Fox, A.	Mernda	59	Nebel, Mrs. A. E.	Thomastown	38
French, T. W.	Wollert	43	Norton, O. G.	Bundoora	37
French, W.	Greenvale	51	O'Hern, T.	Epping	58
Galbraith & Walker	Greensborough	36	O'Loughlin, W. L.	Epping	27
Gamble Bros.	Greenvale	156	Parker, Mrs. A. E.	Greensborough	24
Gallus, E. A.	Doncaster	11	Patullo, F. E.	Mickleham	36
Gardiner, C. E.	Epping	20	Pettit, W. H.	Thomastown	36
Gibbs, C.	Arthur's Creek	28	Pitson, R H.	Yarrambat	17
Goodman, A. E.	Broadmeadows East	55	Power, L. J.	Mernda	52
Graff, Mrs. M. G.	Mernda	24	Quinlan Bros.	Epping	49
Graham Bros.	Whittlesea	71	Rawlings, J. H.	Whittlesea North	41
Green, W.	Mernda	11	Righetti, L. A.	Lower Templestowe	40
Hall, J. E., Mrs.	Whittlesea North	13	Robson, Mrs. G. A.	South Morang	47
Hancorne, Miss M. R.	Yan Yean	27	Rodgers, E.	Whittlesea North	11
Harding, J. E.	Templestowe	42	Rosewarne, Miss P.	Yan Yean	43
Hargreave, Mrs. E. J.	Whittlesea	21	Seeber, B.	Thomastown	24
Harkness, H. J.	South Morang	31	Shanks, John	Mernda	73
Harmer, R. E.	Wollert	38	Sheeky, A. A.	Templestowe	14
Hawkes, Miss D.	Warrandyte	19	Short, E.	East Preston	99
Hehr, H.	Epping	32	Siebel, F.	Thomastown	26
Hehr, R.	Wollert	23	Simpson, W. G.	Donnybrook	12
Henshaw, Miss A.	Templestowe	16	Skals, P.	Rosanna	28
Herd, J.	Epping	46	Smirfitt, J. E.	Epping	39
Hewitt, C. J.	Wattle Glen	8	Smith, G. A.	Templestowe	63
Higgs, R. N.	Yan Yean	76	Smith, J. R.	Mernda	34
Hobbs, Mrs. F. J.	Doncaster East	6	Smith, L. McA.	Yan Yean	2
Hobbs Bros.	Heidelberg	65	Smith, L. W.	Bundoora	73
Howden, A.	Epping	29	Smith, P. A.	Ivanhoe	2
Howell, G. G.	Wollert	221	Smith, R. A.	Epping	26
Hughes, J.	South Morang	1	Smith, S. E.	Epping	31
Hussey, Mrs. S.	Warrandyte	1	Southon, H. W.	South Morang	27
Jackson, Mrs. M. A.	Heidelberg	7	Stephens, H.	Epping	48
Jenkins, T. H.	Whittlesea	24	Stimson, T.	Woodstock	33
Johnstone, J. A., Miss	Mernda	14	Tarry, J.	South Morang	24
Jones, A. J.	South Morang	30	Thomas, Mrs. E.	Broadmeadows	11
Jukes, C.	Epping	39	Thomas, W. C.	Yan Yean	31
Jukes, W. H.	South Morang	35	Towt, C. W.	Glenvale	136
Junor, G. M.	South Morang	37	Trethowan, F. W.	Donnybrook	94
Kell, W. E.	Greensborough	21	Trist, H. P.	Greensborough	8
Lay, P.	Alphington	30	Troutbeck, H. R.	Mickleham	47
Loft, A. H.	Wollert	52	Vallence, C. A.	Epping	11
Lynch, D.	Donnybrook	44	Van, E. L.	Templestowe	28
McCormack, D.	Woodstock	33	Walsh, J. B.	Templestowe	11
McDonald, A. J.	Whittlesea	2	Whelpton, B.	Whittlesea North	59
McDowell, R. H.	Greensborough	28	White, W.	Greensborough	18
McGregor, W. B.	Mernda	41	Whittingham, E. W.	Greensborough	41
McKay, J. M.	Coburg	62	Williams, E. A.	Thomastown	33
McKay, L.	Kal Kallo	12	Williamson, J.	Doncaster (High-street)	5
McKendry, J.	Doreen	47	Willis Bros.	Craigieburn	61
McKernan, A. H.	Whittlesea	24	Wilson, J. E.	Diamond Creek	35
McKie, J. W.	Wollert	83	Wilson, Mrs. M.	South Morang	14
McLean, J. F.	Bundoora	32	Wood, A. V.	Yan Yean	125
McPhee, K.	Whittlesea	116	Wrest, W.	Epping	77
McPherson, A.	Yan Yean	64	Wuchatsch, J. D.	Epping	14
Mason, N.	Donnybrook	52	Yann, R.	Wollert	52
May, Mrs. M.	Warrandyte	5	Young, Mrs. A.	Wollert	33
Mays, Mrs. A. M.	Doncaster	5	Ziebell, H.	Thomastown	32
Merriman, J.	Diamond Creek	17			

There are also 379 herds in which 10,658 head of cattle have passed one test, and may be considered, therefore, to be in process of becoming tubercle-free herds.

Standard Herd Records

For Quarter ended 30th September, 1942

In the following is set out the records of all cows which completed a lactation during the quarter. The number is 553, of which 412 qualified for the certificate. The figure in brackets after the owner's name shows the number of entries.

The amount of butter-fat required for qualification varies with the age class to which the animal belongs, the standard being as follows:—

Junior 2-year-old (under 2½ years at time of calving)	230 lb. butter-fat.
Senior 2-year-old (between 2½ and 3 years at time of calving) ..	250 lb. butter-fat.
Junior 3-year-old (between 3 and 3½ years at time of calving) ..	270 lb. butter-fat.
Senior 3-year-old (between 3½ and 4 years at time of calving) ..	290 lb. butter-fat.
Junior 4-year-old (between 4 and 4½ years at time of calving) ..	310 lb. butter-fat.
Senior 4-year-old (between 4½ and 5 years at time of calving) ..	330 lb. butter-fat.
Mature cow 5 years and over	350 lb. butter-fat.

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Andrew, W., Whittlesea, Ayrshire (1).										
Couron Ada 2nd ..	29233	273	4	6,012	4·42	265·7	350	Mature	347 ..	Couron Luminous
Atkinson, W. K., Swan Hill, Dairy Shorthorn (20).										
Willow Park Blush 10th ..	1641D	273	5½	11,506	5·36	409·4	330	Sr. 4	353, 364 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Blush 12th ..	1642D	273	18	8,901	3·69	328·2	270	Jr. 3	378 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Camelia 26th	1647D	273	9	7,526	2·98	224·4	310	Jr. 4	265 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Camelia 37th	1506C	273	19½	8,270	3·53	291·7	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Comet 14th ..	528D	273	23½	11,130	3·71	413·2	350	Mature	290, 381, 384, 423, 436	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Comet 19th ..	532D	273	5	7,077	4·19	296·6	350	Mature	335, 103, 187	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Countess 30th	1511C	273	6	7,377	3·08	227·1	310	Jr. 4	319 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Countess 32nd	1663D	273	4½	7,398	3·64	269·5	290	Sr. 3	314 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Dainty 18th..	1519C	273	19	8,643	3·34	288·6	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Damsel 5th ..	1266E	273	14	11,397	3·48	396·4	350	Mature	243, 338, 349, 355, 422	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Duchess 28th	543D	273	10	8,614	3·68	317·2	350	Mature	239, 302, 396, 387, 446	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Duchess 45th	1526C	273	25	8,040	3·86	310·3	250	Sr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Duchess 47th	1528C	273	25	8,699	3·96	344·4	230	Jr. 2	.. ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Fairy 10th ..	550D	273	17	10,737	3·76	403·7	350	Mature	269, 325, 352, 392	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Fairy 12th ..	1530C	273	10½	10,118	3·31	334·8	310	Jr. 4	354, 425 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Melba 25th ..	554D	273	20	10,905	3·74	407·9	350	Mature	282, 377, 508	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Melba 26th ..	555D	273	18	9,005	3·53	318·1	350	Mature	311, 337 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Melba 35th ..	1686D	273	24½	11,598	3·62	420·3	270	Jr. 3	380 ..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Moss Rose 17th	1692D	273	18	8,298	3·69	306·1	270	Jr. 3	333 ..	Anderson Imperial Cran 6th (Imp.)
Willow Park Rosebud ..	243A	273	N.o.c.	6,708	3·42	229·6	350	Mature	241, 273, 179, 202	Steventon Forester
Ballarat Orphanage, Ballarat, Jersey (13).										
Banyarra Aria 2nd ..	47113	273	20	7,487	5·60	419·3	350	Mature	274, 429, 403, 545	Retford King Bracken
Orphanage Attractive 8th..	58808	273	10½	7,577	5·49	416·1	350	Mature	444, 534 ..	Rowallan Celebrity
Orphanage Lotus ..	68460	273	17	8,706	5·30	461·8	310	Jr. 4	283, 409 ..	Orphanage Mabel's Chief
Orphanage Melba 9th ..	63535	273	15½	6,797	5·41	367·5	350	Mature	471, 454 ..	Rowallan Celebrity
Orphanage Mirthmaker 7th	58821	273	20	8,424	4·85	408·8	350	Mature	325, 425, 419, 384	Orphanage Molly's Thorn
Orphanage Mirthmaker 9th	78256	273	26½	10,740	5·30	570·2	330	Sr. 4	635 ..	Rowallan Celebrity
Orphanage Molly 5th ..	68463	273	18	7,361	5·01	368·7	350	Mature	269, 317, 430	Orphanage Molly's Thorn

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Ballarat Orphanage, Ballarat, Jersey—*continued.*										
Orphanage Pearl 5th ..	41409	273	20	9,183	5·05	463·7	350	Mature	252, 419, 388, 445, 438, 428	Orphanage Quicksand's Prince
Orphanage Quicksand 4th	49977	273	20½	8,436	5·08	428·4	350	Mature	394, 434, 506, 464	Jerseylea Quality Boy
Orphanage V.C's. Molly 4th	58829	273	19	8,457	5·15	435·5	350	Mature	229, 332, 393, 438	Rowallan Celebrity
Orphanage Zaffarine 11th	73309	273	22	8,195	6·42	526·4	310	Jr. 4	402, 482 ..	Rowallan Celebrity
Uphaven Silver Dawn ..	79350	273	16	6,650	5·90	392·5	250	Sr. 2	313 ..	Banyule Terraplane
Orphanage Attraction 8th	54571	273	29	9,471	5·11	484·1	350	Mature	333, 331, 394, 438, 354	Jerseylea Quality Boy
Banyule Pty. Ltd., Wangaratta, Jersey (1).										
Banyule Molly 60th ..	56258	273	25½	10,802	5·60	605·1	330	Sr. 4	432, 524 ..	Banyule Oxford Don
Bennett, J. W., Yinnar, Jersey (11).										
Ellendale Bluebell 14th ..	71150	273	N.C.K.	8,721	5·15	448·7	350	Mature	436 ..	Staghorn Bellboy
Ellendale Bluebell 17th ..	76075	273	N.C.K.	8,396	6·10	511·8	310	Jr. 4	441 ..	Avalon Prince Madeira
Ellendale Bluebell 18th ..	76076	273	N.C.K.	7,191	5·00	359·3	290	Sr. 3	412 ..	Staghorn Bellboy
Ellendale Bluebell 21st ..	C.R.	273	N.C.K.	5,801	4·98	288·8	230	Jr. 2	.. ..	Avalon Prince Madeira
Ellendale Cloudy 6th ..	76079	273	N.C.K.	8,424	5·74	483·2	270	Jr. 3	459 ..	Avalon Prince Madeira
Ellendale Duchess 9th ..	Vol. 30	273	15	6,429	5·89	378·8	230	Jr. 2	.. ..	Avalon Prince Madeira
Ellendale Kirsty 23rd ..	71154	273	N.C.K.	7,257	4·91	356·4	350	Mature	.. ..	Staghorn Bellboy
Ellendale Romany 11th ..	76089	273	N.C.K.	7,223	5·82	420·3	310	Jr. 4	426 ..	Avalon Prince Madeira
Ellendale Romany 16th ..	76093	273	N.C.K.	8,331	5·34	444·5	270	Jr. 3	369 ..	Avalon Prince Madeira
Ellendale Romany 17th ..	C.R.	273	N.C.K.	8,280	4·84	400·9	230	Jr. 2	.. ..	Staghorn Bellboy
Ellendale Romany 18th ..	C.R.	273	N.C.K.	6,074	6·26	380·3	230	Jr. 2	.. ..	Avalon Prince Madeira
Bennett, R. H., Lancefield, Jersey (8).										
Edenhope Peach Blossom ..	Vol. 29	273	13	4,344	6·57	285·3	230	Jr. 2	.. ..	Jindivick Defiance
Edenhope Countess ..	66300	273	12½	6,397	6·05	387·3	350	Mature	326, 388 ..	Edenhope Masterpiece
Edenhope Dawn	Vol. 29	273	12	4,466	5·44	243·1	230	Jr. 2	.. ..	Jindivick Defiance
Edenhope Myrl	57122	273	20½	8,282	5·51	456·5	350	Mature	453, 595 ..	Edenhope Canary's Count
Edenhope Necklace ..	71113	273	13½	7,017	4·45	312·0	290	Sr. 3	229, 345 ..	Lancefield Madeira's Chance
Edenhope Northwood Madeira	Vol. 29	273	14	4,137	5·69	235·3	230	Jr. 2	.. ..	Jindivick Defiance
Edenhope Queenie ..	66306	273	16½	7,298	5·50	401·1	330	Sr. 4	412, 455 ..	Edenhope Masterpiece
Edenhope Rosetta ..	76038	273	11	7,104	5·51	391·1	270	Jr. 3	482 ..	Edenhope First Choice
Black, Estate of the late I. S., Noorat, Ayrshire (4).										
Mount Noorat Alert 9th ..	32803	273	11	5,950	3·95	234·7	270	Jr. 3	332 ..	Mount Noorat Gerontius
Mount Noorat Georgina 5th	29777	273	12	9,469	4·29	406·1	350	Mature	379, 318, 466, 415	Gowrie Park Scottish Patron
Mount Noorat Georgina 8th	30777	273	11	5,388	4·54	244·6	350	Mature	341, 448, 387	Mount Noorat Loudon
Killock Juniper (Imp.) ..	80966	273	23	7,899	5·01	396·0	310	Jr. 4	370, 371 ..	Burton Signet
Boland Bros., Glenormiston North, Ayrshire (3).										
Kolorn Dahlia	32713	180	4	2,940	4·33	128·7	310	Jr. 4	.. ..	Kolorn Major
Kolorn Hilda 2nd ..	Vol. 34	240	4	3,615	4·92	178·0	230	Jr. 2	.. ..	Lake Meadow's Briar Bush
Kolorn Lina	32719	210	4	4,920	4·17	205·1	290	Sr. 3	.. ..	Lake Meadow's Briar Bush
Bott, J., Yarrawonga, Red Poll (5).										
Lornshill Holly	6527AA	273	N.C.K.	7,227	4·05	293·0	350	Mature	.. ..	Woodburn Wiseman
Naranghi Dido	6947A	273	40	11,792	3·59	423·9	350	Mature	.. ..	Bundure Winter
Naranghi Dusk	C.R.	240 (Sold)	..	5,025	3·88	194·8	270	Jr. 3	.. ..	Bundure Winter
Naranghi Jinny	7909A	273	N.C.K.	7,166	3·56	255·3	350	Mature	.. ..	Bundure Winter
Naranghi Peace	C.R.	273	N.C.K.	7,620	3·50	266·4	250	Sr. 2	.. ..	Flowering Vale Purrtime
Broad, Mrs. A. A., Sutton Grange, Jersey (11).										
Gladfield Beryl	Vol. 29	273	N.O.C.	4,811	5·72	275·1	230	Jr. 2	.. ..	Grangelea Percival
Grangelea Bunty's Maid ..	66750	273	20	6,827	5·57	380·4	310	Jr. 4	341, 379 ..	Grangelea Roderick 2nd
Grangelea Damsel 6th ..	66753	273	20	6,330	5·85	370·0	310	Jr. 4	326, 366 ..	Grangelea Roderick 2nd
Grangelea Doris 5th ..	66755	273	16	6,215	5·11	319·4	310	Jr. 4	346 ..	Grangelea Roderick 2nd
Grangelea Pretty Primrose 2nd	61943	273	18	6,459	5·11	330·2	350	Mature	441, 388, 401	Grangelea Daffodil's Airo
Grangelea Pretty Primrose 4th	71629	273	13	5,064	6·21	314·5	250	Sr. 2	244 ..	Grangelea Daffodil's Airo
Grangelea Remembrance ..	76591	273	N.O.C.	4,526	6·01	272·2	230	Jr. 2	.. ..	Grangelea Daffodil's Airo
Grangelea Rose 9th ..	76593	273	16	4,638	5·79	268·7	230	Jr. 2	.. ..	Grangelea Daffodil's Airo
Grangelea Velveretta ..	71635	273	15	5,822	5·29	308·0	250	Sr. 2	249 ..	Grangelea Daffodil's Airo
Grangelea Vida	76594	273	20	5,610	5·27	295·5	230	Jr. 2	.. ..	Banyule Upcast
Grangelea Viola	66769	273	20	6,560	4·98	326·9	310	Jr. 4	342, 337 ..	Grangelea Daffodil's Airo

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Bruhn, C. H., Mirboo North, Jersey (3).										
Bindarring Tiddlewinks 9th	47254	273	12	6,099	5·28	321·9	350	Mature	.. ..	Bindarring Chief
Silverbrae Queen 3rd ..	69089	273	14	6,921	5·66	391·5	310	Jr. 4	.. ..	Silverbrae King
Sylvan Hill Meadow Sweet	74051	273	7	5,031	6·82	343·2	290	Sr. 3	.. ..	Glen Iris Bow bells
Butcher, F. T., Swan Hill, Red Poll (8).										
Maryville Dainty	7860A	273	12	5,353	5·08	272·1	230	Jr. 2	.. ..	Victoria Generator B
Maryville Elf	7861A	273	13	5,739	3·73	214·0	230	Jr. 2	.. ..	Temperley Prism
Maryville Elva	3722A	273	27½	9,968	4·20	418·5	350	Mature	304, 402, 355, 400, 239, 437	Victoria King Bird
Maryville Fay	6910A	273	26	9,095	3·77	342·5	290	Sr. 3	218, 290 ..	Temperley Prism
Maryville Model	6911A	273	19	8,822	4·46	393·9	310	Jr. 4	256, 375 ..	Temperley Prism
Maryville Olga	8022C	273	19	7,392	4·63	341·9	230	Jr. 2	.. ..	Victoria Generator B
Maryville Rhoda ..	7867A	273	6	6,243	3·73	232·6	250	Sr. 2	285 ..	Chanipara Ferdinand
Maryville Susie	8023C	273	15½	6,497	4·33	281·0	230	Jr. 2	.. ..	Temperley Prism
Carne, W., Pakenham Upper, Jersey (1).										
Wonga Park Songbird ..	74607	273	23	9,578	5·12	490·7	290	Sr. 3	404, 437 ..	Wonga Park Minx's Ace
Chirnside, R. M., Whittlesea, Jersey (6).										
Mornmoot Fancy Madeira 6th	58563	273	12½	8,973	5·01	449·3	350	Mature	421, 544, 544	Werribee Madeira's Ace
Mornmoot Fancy Starbright 3rd	63199	273	7½	8,379	5·62	471·2	310	Jr. 4	423, 530 ..	Werribee Madeira's Ace
Mornmoot Fancy Starbright 4th	63200	273	13	8,343	6·32	526·9	290	Sr. 3	388, 547 ..	Werribee Warrior
Mornmoot Princess Madeira 9th	58569	273	19½	11,433	5·52	631·5	350	Mature	426, 551, 661	Werribee Warrior
Mornmoot Princess Madeira 14th	63204	273	15½	10,368	5·14	533·4	290	Sr. 3	372, 487 ..	Werribee Warrior
Werribee Alexia	79580	273	23	7,344	5·06	371·4	230	Jr. 2	.. ..	Werribee Rex
Clarke, A. B., Glenormiston South, Jersey (1).										
Denniston Princess 8th ..	71016	273	16	7,781	4·88	379·9	290	Sr. 3	305 ..	Belgonia Noella's Peer
Clarke, F. W., Toora, Jersey (3).										
Frankwell Posy	66485	273	N.C.K.	6,108	5·94	362·7	350	Mature	407 ..	Berrington Largo
Mer Vue Butterball ..	67907	273	N.C.K.	6,696	5·70	382·0	330	Sr. 4	360, 287, 408	Berrington Largo
Mer Vue Cissie 2nd ..	67912	273	N.C.K.	8,874	5·27	468·1	290	Sr. 3	325, 314 ..	Berrington Largo
Clark, P. W., Whittlesea, Jersey (4).										
Coodardy Aldan's Glorious	75735	273	25	10,626	5·81	617·8	270	Jr. 3	456 ..	Staghorn Lord Aldan 3rd
Coodardy Centurion's Annette	70823	273	22½	9,699	4·85	470·6	310	Jr. 4	345 ..	Werribee Centurion
Coodardy Centurion's Gloria 3rd	75738	273	20½	6,776	4·49	304·2	270	Jr. 3	323 ..	Werribee Centurion
Coodardy Wyandotte ..	C.R.	273	31	9,594	5·24	502·9	230	Jr. 2	.. ..	Werribee Centurion
Colenso, L. W. R., Alvie, Jersey (1).										
Normandie Golden Nancy	49363	273	23	8,454	5·70	481·9	350	Mature	352, 353, 352, 374, 396, 538	Normandie Golden Peer
Cook, D. E., Loch, Jersey (5).										
Riversdale Desert Gold ..	73695	273	N.C.K.	4,971	5·82	289·2	350	Mature	.. ..	Hill Farm Treasure
Wattle Vale Doreen ..	Vol. 29	273	N.C.K.	5,426	5·03	273·0	290	Sr. 3	.. ..	Ewelme Eileen's Northern
Wattle Vale Frolic ..	Vol. 29	273	9½	5,279	6·03	318·3	290	Sr. 3	.. ..	Ewelme Eileen's Northern
Wattle Vale Glitter ..	79540	273	N.C.K.	6,943	6·28	435·9	290	Sr. 3	.. ..	Ewelme Eileen's Northern
Wattle Vale Magic ..	79544	273	6½	3,335	5·23	174·4	270	Jr. 3	198 ..	Wattle Vale Golden Age
Coulthard, J. J., Whittlesea, Jersey (6).										
Walamba Betsy	79434	273	N.C.K.	4,677	5·50	257·1	270	Jr. 3	274 ..	Selsey Wonderful Boy
Walamba Bonnie ..	C.R.	273	N.C.K.	4,314	5·63	242·8	230	Jr. 2	.. ..	Airlie Don
Walamba Lady Bird ..	39564	273	N.C.K.	6,242	5·55	346·3	350	Mature	195, 259, 313, 359	Clarendon Eyre Brigadier 3rd
Walamba Lady Brae ..	Vol. 29	273	N.C.K.	4,616	5·13	238·5	230	Jr. 2	.. ..	Airlie Don
Walamba Nellie Grey ..	Vol. 29	273	N.C.K.	6,530	5·49	358·8	230	Jr. 2	.. ..	Airlie Don
Walamba Rosalie ..	Vol. 29	273	N.C.K.	6,097	5·75	350·7	270	Jr. 3	326 ..	Selsey Wonderful Boy
Cowan, G. L. S., Bacchus Marsh, Friesian (5).										
Pemberley Posch.. ..	4878	273	30	12,843	2·72	350·0	350	Mature	474 ..	Burnbank Prince Patch
Upper Lappan Ollie ..	Vol. 15	273	28	10,704	3·27	350·3	270	Jr. 3	267 ..	Elgin Glen Segis
Ingolston Black Rose ..	5667	273	30	10,845	3·28	355·8	350	Mature	417 ..	Ingolston Sylvester
Upper Lappan Beth ..	Vol. 15	273	33	10,278	3·53	367·8	250	Sr. 2	.. ..	Upper Lappan Pontiac
Upper Lappan Edna ..	6069	273	34	11,389	3·32	378·0	290	Sr. 3	316 ..	Elgon Glen Segis
Cuddily, T. D., Geelong, Jersey (1).										
Mount Anakie Doll ..	77873	273	11½	3,920	5·93	234·4	250	Sr. 2	.. ..	Mount Violet Count's Rochette

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
De La Rue, N. C., Weering, Jersey (2).										
Lara La Reine	53696	240	4	5,580	5·36	298·9	350	Mature	.. ..	Avalon Gladiator
Lucerne Vale Madeira 7th	Vol. 29	273	22	6,171	5·80	358·2	230	Jr. 2	.. ..	Mornmoot Monitor
Dennis, Mrs. A. A., Frankston, Jersey (3).										
Ballam Gamboge Fancy	70127	273	13	5,589	5·90	329·5	270	Jr. 3	.. ..	The Wattle's Gamboge Prince
Ballam Lilac Domino ..	65286	273	19	7,377	6·31	465·3	310	Jr. 4	335, 432 ..	Clarendon Eyre Oxford Observer
Clarendon Eyre Rose Marie 11th	52266	273	18	7,302	5·41	395·1	350	Mature	389 ..	Rochette's Golden (Imp.)
Department of Agriculture, Burnley, Jersey (2).										
Victoria Flirting Princess ..	74373	273	17½	5,128	6·40	328·3	230	Jr. 2	.. ..	Selsey Spotted Prince
Victoria Princess Betty ..	59873	273	15	7,425	4·86	361·2	350	Mature	429, 456, 496	Selsey Viola's Boy
Department of Agriculture, Werribee, Friesian (8).										
Victoria Belle	6075	273	N.C.K.	14,478	3·15	456·6	310	Jr. 4	344 ..	Rupertswood Inka Jo
Victoria Choir	6077	273	N.C.K.	6,860	3·59	246·4	230	Sr. 3	371 ..	Rupertswood Inka Jo
Victoria Guitar	6085	240	N.C.K.	7,845	3·36	263·2	270	Jr. 3	311 ..	Victoria Mikado
Victoria Ilka Domino ..	Vol. 15	273	N.C.K.	9,327	4·09	381·8	230	Jr. 2	.. ..	Victoria Ilka Jo
Victoria Joyce	C.R.	273	N.C.K.	7,011	3·73	261·4	230	Jr. 2	.. ..	Victoria Ilka Jo
Victoria Lark	Vol. 15	273	N.C.K.	8,712	3·81	332·3	230	Jr. 2	.. ..	Victoria Conductor
Victoria Songbird ..	6098	273	N.C.K.	11,426	3·39	387·8	310	Jr. 4	260, 332 ..	Rupertswood Inka Jo
Victoria Rita	6097	273	N.C.K.	16,657	3·45	574·5	310	Jr. 4	285, 468 ..	Rupertswood Inka Jo
Department of Agriculture, Werribee, Red Poll (20).										
Victoria Agrestis	3889A	273	N.C.K.	10,869	3·94	428·7	350	Mature	238, 288, 353, 348, 408	Dominion Bright Belgian
Victoria Albatross ..	6707AA	273	N.C.K.	7,047	4·18	294·6	350	Mature	249, 282, 374	Chandpara Valentine
Victoria Apricot	7953A	273	N.C.K.	6,206	4·50	279·2	290	Sr. 3	214 ..	Victoria Ghurka
Victoria Auxiliary ..	7954A	273	N.C.K.	5,487	5·06	277·5	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Chest	7011A	273	N.C.K.	8,223	4·05	333·0	350	Mature	252, 431 ..	Chandpara Valentine
Victoria Divorce	Vol. 12	273	N.C.K.	5,927	4·51	267·4	230	Jr. 2	.. ..	Woodburn Peter Pan
Victoria Grateful ..	7960A	240 (Sold)	..	5,130	4·90	251·4	310	Jr. 4	264 ..	Woodburn Peter Pan
Victoria Grebe	7961A	273	N.C.K.	6,955	4·15	288·8	330	Sr. 4	283, 274 ..	Chandpara Valentine
Victoria Maid Marion ..	5690AA	273	N.C.K.	9,865	4·13	370·7	350	Mature	316, 437, 445, 425, 349	Woodburn Peter Pan
Victoria Matrimony ..	Vol. 12	273	N.C.K.	5,753	4·19	241·3	270	Jr. 3	287 ..	Woodburn Peter Pan
Victoria Prune	7021A	273	N.C.K.	10,121	4·35	440·0	350	Mature	277, 362, 382	Woodburn Peter Pan
Victoria Meadow ..	7964A	273	N.C.K.	4,923	4·18	205·8	230	Jr. 2	.. ..	Chandpara Valentine
Victoria Pan Velvet ..	7586AA	273	N.C.K.	9,899	4·42	437·8	290	Sr. 3	409 ..	Woodburn Peter Pan
Victoria Plum	7020A	273	N.C.K.	9,560	4·13	395·1	330	Sr. 4	264, 315, 417	Woodburn Peter Pan
Victoria Royal Red Cross	4506AA	273	N.C.K.	7,991	4·10	327·7	350	Mature	214, 304, 323, 295, 344, 374	Victoria Royal Ringer
Victoria Skip	7969A	273	N.C.K.	6,825	4·25	290·3	230	Jr. 2	.. ..	Chandpara Valentine
Victoria Sunset	7973A	273	N.C.K.	4,974	4·55	226·2	230	Jr. 2	.. ..	Victoria Petrology
Victoria Tranquillity ..	7026A	273	N.C.K.	8,991	4·29	385·4	330	Sr. 4	273, 313 ..	Chandpara Valentine
Victoria Trojan	7027A	273	N.C.K.	5,469	4·80	262·5	330	Sr. 4	379, 298 ..	Woodburn Peter Pan
Victoria Volt	4049B ..	273	N.C.K.	10,836	4·20	455·4	350	Mature	296, 369, 398, 515, 537, 512, 490, 437	Victoria Vice Captain
Desmond, J. J., Rochester, Jersey (8).										
Keyuga Betty	53543	273	N.C.K.	5,625	5·53	311·1	350	Mature	.. ..	Banyule Silvate
Macroom Edna 2nd ..	53909	273	N.C.K.	8,403	4·96	417·1	350	Mature	337, 375, 392, 357	Glen Alvie Statesman
Macroom Edna's Lassie ..	Vol. 29	273	N.C.K.	6,801	6·32	429·6	270	Jr. 3	.. ..	Macroom Lassie's Mikado
Macroom Ellen's Pet ..	C.R.	210	N.C.K.	2,430	5·87	142·7	230	Jr. 2	.. ..	Macroom Ellen's Noble
Macroom Graceful Duchess	Vol. 29	273	N.C.K.	6,542	4·61	301·7	350	Mature	275, 326 ..	Macroom Mortimer
Macroom Peggy 4th ..	Vol. 29	273	N.C.K.	5,735	5·48	314·2	350	Mature	.. ..	Glen Alvie Statesman
Macroom Princess 3rd ..	72600	273	N.C.K.	6,644	6·04	401·4	290	Sr. 3	.. ..	Clifford Farm Robin Adair
Taranah Fairy	16716	273	13	6,669	5·82	388·0	350	Mature	351, 445, 457, 484, 485, 453, 474, 558, 560, 558, 495, 489	Lily 6th's Son of Melrose
Devon Park Stud Farm (G. S. Daley), Lilydale, Jersey (13).										
Belgonia Design's Empire 2nd	60535	273	N.C.K.	6,665	4·90	326·4	350	Mature	284, 330, 351	Belgonia Lady's Duke
Belgonia Design's Empire 3rd	60536	273	N.C.K.	6,795	4·90	333·2	350	Mature	242, 278, 334	Design's Ruler (Imp.)
Belgonia Design's Perree 2nd	56317	273	N.C.K.	6,585	5·56	366·2	350	Mature	317, 386, 287	Design's Ruler (Imp.)
Belgonia Marie 10th ..	70239	273	N.C.K.	8,129	4·68	380·4	310	Jr. 4	268, 362 ..	Aim High (Imp.)

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Devon Park Stud Farm (G. S. Daley), Lilydale, Jersey—*continued.*										
Belgonia Eileen 2nd ..	42921	273	N.C.K.	12,895	5·16	665·4	350	Mature	427, 561, 620, 621, 696, 660	Duke of the Lake (Imp.)
Belgonia Gem's Noella 2nd	56320	273	N.C.K.	7,424	5·02	372·4	350	Mature	360, 255, 409, 419	Design's Ruler (Imp.)
Karrara Perree's Primrose	67355	273	N.C.K.	9,980	5·28	527·0	330	Sr. 4	420, 485 ..	Springhurst Perree's Quality (Imp.)
Karrara Standard Gem ..	77087	273	N.C.K.	5,460	5·65	308·3	230	Jr. 2	.. ..	Brampton Sporting Standard (Imp.)
Karrara Standard Noella ..	77089	273	N.C.K.	4,850	6·06	293·8	230	Jr. 2	.. ..	Brampton Sporting Standard (Imp.)
Karrara Standard Peree ..	77090	273	N.C.K.	4,322	6·10	263·8	230	Jr. 2	.. ..	Brampton Sporting Standard (Imp.)
Karrara Standard Tecoma	77091	273	N.C.K.	5,978	5·98	357·3	230	Jr. 2	.. ..	Brampton Sporting Standard (Imp.)
Selsey Clementine's Ricious	69057	273	N.C.K.	5,772	6·33	365·6	350	Mature	333, 378 ..	Mornmoot Clementine's King
Sutton Lea Eline ..	74031	273	N.C.K.	10,346	4·68	484·3	310	Jr. 4	286, 480 ..	Staghorn Prince Aldan
Dookie Agricultural College, Dookie, Ayrshire (3).										
Dookie Fossie	33478	273	17	7,278	4·26	310·4	270	Jr. 3	193 ..	Gowrie Park Bonnie Sailor
Dookie Hope	33479	273	18½	7,612	5·01	381·7	350	Mature	292 ..	Tregorland Indisponsible
Dookie Peon	Vol. 34	273	23	7,520	4·03	303·0	250	Sr. 2	.. ..	Gowrie Park Bonnie Sailor
Doyle, Dr. G., Arthur's Creek, Jersey (2).										
Maxmount Pride's Treasure	Vol. 29	180	4	2,160	5·36	115·8	270	Jr. 3	.. ..	Maxmount Danny Boy
Maxmount Twinkle Star 2nd	Vol. 29	273	8½	4,053	5·27	213·6	230	Jr. 2	.. ..	Maxmount Pearl's Master
Dunmore, T. J., Melton, Jersey (4).										
Laura Dell Doreen ..	77290	273	15	5,235	5·54	290·0	250	Sr. 2	237 ..	Avalon Gladstar 34th
Laura Dell Gladena ..	72360	273	22	8,304	5·16	428·9	290	Sr. 3	359 ..	Avalon Gladstar 34th
Laura Dell Glowena ..	77291	273	13	4,740	5·11	242·0	230	Jr. 2	.. ..	Muswell Reflection
Laura Dell Starena ..	77293	273	14	4,617	5·88	271·5	230	Jr. 2	.. ..	Avalon Gladstar 34th
Eltringham, W. B., Lilydale, Jersey (1).										
Clifford Farm Bell ..	75660	273	21	6,107	4·59	280·6	230	Jr. 2	.. ..	Tavistock Quality Lad
Enders, N. H., Stanhope, Jersey (2).										
The Wattles Moleen 5th ..	74164	240 (Sold)	..	6,402	5·81	372·1	250	Sr. 2	346 ..	The Wattles Silver Gamboge
The Wattles Silvermine 9th	74169	273	20	7,038	6·18	434·9	270	Jr. 3	345 ..	The Wattles Young Gamboge
Everist, F. R., Tyabb, Red Poll (1).										
Chota Wallah Poppy ..	C.R.	273	N.C.K.	4,573	4·13	188·9	230	Jr. 2	... ..	Northwood Rangi
Fairchild and Clutterbuck, Tinamba, Jersey (12).										
Keyuga Beth	67421	273	N.C.K.	6,548	5·05	331·0	310	Jr. 4	278, 324 ..	Keyuga Bold Pilot
Rowallan Silvermine 4th ..	64128	273	N.C.K.	9,173	4·60	422·2	330	Sr. 4	400, 436 ..	Banyule Comet
Selsey Free Girl 3rd ..	78876	273	N.C.K.	6,882	5·35	368·5	270	Jr. 3	341 ..	Samare's Golden Prince (Imp.)
Vaucluse Blossom 3rd ..	Vol. 29	273	N.C.K.	6,774	5·81	393·9	230	Jr. 2	.. ..	Paisley Master
Vaucluse Butterfly ..	79402	273	N.C.K.	6,921	5·64	390·0	250	Sr. 2	305 ..	Leven Brae Queenie's Pride
Vaucluse Daphne 2nd ..	65922	273	N.C.K.	6,260	5·69	356·2	350	Mature	326, 293, 391	Glen Iris Violin
Vaucluse Daphne 4th ..	79403	273	N.C.K.	7,146	4·90	350·5	250	Sr. 2	318 ..	Vaucluse Masterpiece
Vaucluse Empress 7th ..	79405	273	N.C.K.	7,413	5·53	410·3	250	Sr. 2	298 ..	Vaucluse Masterpiece
Vaucluse Kirsty 3rd ..	74353	273	N.C.K.	5,819	5·83	339·1	290	Sr. 3	304, 380 ..	Glen Iris Violin
Vaucluse Madrigal 2nd ..	Vol. 29	273	N.C.K.	8,276	5·59	462·4	270	Jr. 3	.. ..	Paisley Master
Vaucluse Marie Rose ..	64739	273	N.C.K.	5,940	5·77	343·0	350	Mature	403, 404, 464, 415	Vaucluse Concentration
Vaucluse Tillr 2nd ..	C.R.	273	N.C.K.	7,859	4·28	336·5	270	Jr. 3	319 ..	Vaucluse Masterpiece
Fixter, A., Boisdale, Guernsey (1).										
Runica's Jessie	2163	273	23	7,691	5·83	448·7	350	Mature	382, 471, 509, 473, 598, 521	Werribee Jessie's Boy
Foster, A. O., Boisdale, Jersey (3).										
Boisdale Della	Vol. 29	273	N.C.K.	4,719	5·81	274·2	230	Jr. 2	.. .. ..	Boisdale Masterpiece
Boisdale Hazel 3rd ..	Vol. 29	273	N.C.K.	5,447	5·39	293·6	230	Jr. 2	.. ..	Boisdale Masterpiece
Boisdale Lady Choice 2nd	Vol. 29	240 (Herd withdrawn)	N.C.K.	5,160	5·55	286·6	230	Jr. 2	.. ..	Boisdale Masterpiece

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Gay, R. G., and Son, Yarram, Jersey (4).										
Elm Grove Buttercup 3rd	61461	273	N.C.K.	8,456	5·42	458·6	350	Mature	264, 499 ..	Elm Grove Graceful Masterpiece
Elm Grove Island Maid 3rd	Vol. 29	273	N.C.K.	9,065	5·58	505·6	270	Jr. 3	.. ..	Glen Iris Golden Man
Elm Grove Lady Loch 2nd	52628	273	N.C.K.	8,466	5·11	432·3	350	Mature	313, 339, 359, 434, 451	Goldstar of Melrose
Elm Grove Linda 8th ..	76115	273	N.C.K.	7,266	5·03	365·7	270	Jr. 3	306 ..	Glen Iris Golden Man
Goddard, J. H., Cora Lynn, Ayrshire (3).										
Inverurie Chrissie 2nd ..	31543	273	N.C.K.	10,119	4·87	493·0	310	Jr. 4	373 ..	Inverurie Peter
Inverurie Hester ..	31544	273	N.C.K.	13,201	5·02	662·6	350	Mature	412, 592, 593	Crescent Farm Amber
Inverurie Merry	Vol. 34	273	N.C.K.	8,445	4·79	404·8	230	Jr. 2	.. ..	Olive Dale Boomerang
Grice, C. S., Somerville, Jersey (1).										
Willis Vale L'Aiglon Capture	69715	273	21½	10,549	4·81	507·4	350	Mature	375, 447 ..	Clarendon Eyre Eminent's L'Aiglon 6th
Handbury, J. E., and Son, Toora, Jersey (4).										
Tooravale Lassie 44th ..	C.R.	273	N.C.K.	5,716	6·43	367·5	230	Jr. 2	.. ..	Tooravale Noble
Tooravale Princess 14th ..	55586	273	N.C.K.	7,361	5·18	381·0	350	Mature	392, 452 ..	Tooravale Gold Speck
Tooravale Princess 39th ..	C.R.	273	N.C.K.	5,458	5·14	280·4	230	Jr. 2	.. ..	Pinewood's Aristocrat (Imp.)
Tooravale Princess 40th ..	Vol. 29	273	N.C.K.	6,281	5·24	328·9	230	Jr. 2	.. ..	Pinewood's Aristocrat (Imp.)
Hardie, R., Lardner, Jersey (3).										
Ewelme Clementine's Maid	48089	273	N.C.K.	7,406	5·28	391·2	350	Mature	357 ..	Staghorn Clementine 4th's Masterpiece
Glen Urquart Silver Maid	Vol. 29	273	N.C.K.	4,986	5·08	253·4	230	Jr. 2	.. ..	Latrobe Triplane
Glen Urquart Silver Queen 4th	71439	273	10	5,828	6·06	353·4	330	Sr. 4	.. ..	Hylsbroke Statesman
Harvey, T., Boisdale, Jersey (12).										
Jerseyholm Bluebell 37th ..	62308	273	N.C.K.	6,404	5·25	335·9	310	Jr. 4	358, 301 ..	Banyule Biplane
Jerseyholm Bluebell 38th ..	67185	273	N.C.K.	5,209	5·14	268·0	310	Jr. 4	262, 241 ..	Banyule Biplane
Jerseyholm Bluebell 39th ..	67186	273	N.C.K.	6,604	4·87	321·9	310	Jr. 4	332, 345 ..	Rowalla Silvanite
Jerseyholm Bluebell 46th ..	71961	250	N.C.K.	5,945	4·96	295·1	250	Sr. 2	316 ..	Orphanage Molly's Commander
Jerseyholm Bluebell 47th	71962	273	N.C.K.	6,503	5·07	329·8	250	Sr. 2	320 ..	Glen Iris Royal Archer
Jerseyholm Bluebell 51st ..	71965	273	N.C.K.	5,639	4·73	266·8	230	Jr. 2	.. ..	Mornmoot Memnon 2nd
Jerseyholm Empress 59th	67192	273	N.C.K.	3,933	4·96	195·2	310	Jr. 4	229, 155 ..	Banyule Biplane
Jerseyholm Empress 65th	71969	273	N.C.K.	6,737	4·41	297·0	270	Jr. 3	233 ..	Orphanage Molly's Commander
Jerseyholm Kirsty 39th ..	62317	240	N.C.K.	5,088	5·37	273·2	310	Jr. 4	336, 300 ..	Banyule Biplane
Jerseyholm Kirsty 40th ..	71976	273	N.C.K.	5,918	5·58	330·2	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Kirsty 42nd ..	71978	273	N.C.K.	5,232	5·11	267·6	230	Jr. 2	.. ..	Orphanage Molly's Commander
Jerseyholm Lady Marge 21st	71981	273	N.C.K.	5,630	4·34	244·1	230	Jr. 2	.. ..	Mornmoot Memnon 2nd
Haywood, Dr. A. R., Hastings, Jersey (9).										
Anemone's Love (Imp.) ..	42695	273	N.C.K.	8,976	5·60	502·4	350	Mature	352, 428 ..	Anemone's Lily Oxford
Glen Iris Royal Viola ..	71422	273	N.C.K.	9,330	5·30	494·5	310	(Jr. 4	323, 426 ..	Glen Iris Royal Gallant
Windrest Chevy's Charm ..	60057	273	N.C.K.	10,011	5·58	558·3	350	Mature	254, 396, 377, 551	Glen Iris Montrose Duke
Windrest Chevy's Delight	79657	273	N.C.K.	7,555	6·46	488·4	270	Jr. 3	473 ..	Gadget (Imp.)
Windrest Chevy's Maiden ..	79658	273	N.C.K.	10,678	5·87	626·6	270	Jr. 3	468 ..	Gadget (Imp.)
Windrest Gay Marie 2nd ..	74578	273	N.C.K.	10,847	5·98	648·3	310	Jr. 4	402, 512 ..	Gadget (Imp.)
Windrest Island Goldmine	69733	273	N.C.K.	13,094	5·03	659·2	350	Mature	319, 430, 602	Gadget (Imp.)
Windrest Rose Marie ..	55878	273	N.C.K.	12,093	5·37	649·1	350	Mature	231, 306, 464, 482, 515, 618	Clarendon Eyre Eminent's Achievement
Windrest Twinkle's Charm	74584	273	N.C.K.	10,902	6·56	715·1	310	Jr. 4	391, 567 ..	Gadget (Imp.)
Higgins, J. A. A., Keysborough, Guernsey (1).										
Brighton Vale De Lys ..	6368	273	20	7,533	4·57	344·4	250	Sr. 2	186 ..	Melbourne Golden Power
Hodgins, G. E., Hastings, Jersey (3).										
Verjean Vanity 2nd ..	74360	273	15	5,610	5·63	315·6	250	Sr. 2	287 ..	Jorian Great Boy
Verjean Venture	74362	273	16½	6,791	4·19	284·4	250	Sr. 2	284 ..	Jorian Great Boy
Jerjean Viscountess ..	74367	273	14	5,576	6·20	345·8	230	Jr. 2	265 ..	Ardleigh Prince Chut
Hore, M. T., Horfield, Friesian (4).										
Elmar Kiltie	Vol. 15	273	N.C.K.	8,562	3·26	279·0	270	Jr. 3	265 ..	Burnbank Iona Rock
Elmar Majoe	Vol. 15	273	N.C.K.	14,041	2·89	405·6	350	Mature	382, 414, 553	Greenvale Oakwood Posch
Elmar Rica	Vol. 15	273	N.C.K.	5,742	3·17	182·3	230	Jr. 2	.. ..	Burnbank Iona Rock
Elmar Trixie	Vol. 15	273	N.C.K.	9,887	3·31	327·1	350	Mature	240, 386, 411	Elmar Sylvia's Lad

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Huffer, J. A., Gormandale, Jersey (7).										
Glenvalley Gladys ..	C.R.	273	N.C.K.	7,695	4·80	369·2	250	Sr. 2	285 ..	Yuleba Fancy Twylish 3rd
Glenvalley Handsome Girl 5th	61863	273	N.C.K.	7,104	5·16	366·4	350	Mature	299, 332, 399, 407	Glenvalley Mercedes Masterpiece
Glenvalley Handsome Girl 6th	71544	273	N.C.K.	6,233	5·86	365·5	310	Jr. 4	284, 330 ..	Glenvalley Mercedes Chief
Glenvalley Pet	66698	273	N.C.K.	7,383	4·45	328·4	350	Mature	248, 303, 426	Glenvalley Sir Roger 2nd
Glenvalley Silvershine 4th	Vol. 29	273	N.C.K.	6,534	5·61	366·4	270	Jr. 3	255 ..	Glenvalley Coral Hero
Glenvalley Silvershine 5th	76537	273	N.C.K.	4,725	5·21	246·4	230	Jr. 2	.. ..	Avon Bonaparte
Glenvalley Waverley Lass 9th	76539	273	N.C.K.	7,206	5·80	418·2	250	Sr. 2	332 ..	Yuleba Fancy Twylish 3rd
Hurrey, Estate of the late W. H., Koonwarra, Jersey (9).										
Burwood Mourier Belle 2nd	60930	273	13	5,889	6·51	383·5	350	Mature	275, 337, 291, 374	Kooreena Handsome Lad
Kooreena Carrie 9th ..	67482	273	14	6,171	5·74	354·5	350	Mature	381, 374 ..	Kooreena Good Luck
Kooreena Lady 5th's Dame	Vol. 30	273	14	5,727	5·48	314·0	310	Jr. 4	285 ..	Kooreena Good Luck
Kooreena Lady 7th's Choice	C.R.	273	16	5,945	5·44	323·4	250	Sr. 2	379 ..	Kooreena Carrie 4th's Laddie
Kooreena Luck's Belle ..	C.R.	273	16	5,703	6·00	342·4	310	Jr. 4	.. ..	Kooreena Good Luck
Kooreena Merle	C.R.	273	10½	3,977	6·47	257·3	230	Jr. 2	.. ..	Kooreena Carrie 4th's Laddie
Kooreena Yo Yo 4th ..	67489	273	17	5,841	5·96	347·9	350	Mature	353, 369 ..	Kooreena Good Luck
Kooreena Yo Yo 6th ..	72282	273	11	4,248	6·41	272·3	310	Jr. 4	291, 306 ..	Kooreena Rover 3rd
Kooreena Yo Yo 8th ..	C.R.	273	12	4,896	6·65	325·6	230	Jr. 2	.. ..	Kooreena Carrie 4th's Laddie
Jackson, H., Lockington, Jersey (3).										
Milvue Design's Chime ..	63098	273	16	8,217	5·92	486·4	350	Mature	319, 408, 437	Belgonia Suspense's Design
Pine Ridge Molly ..	63731	273	22½	9,503	5·74	545·1	350	Mature	285, 408, 471	Duke of the Lake (Imp.)
Surrey Boronia 19th ..	79030	273	16	6,245	5·88	367·2	230	Jr. 2	.. ..	Surrey Lord Madeira
Jeffreson, E. L., Narre Warren, Jersey (3).										
Finchley Handsome Girl 2nd	66458	180	4	2,310	7·65	176·6	310	Jr. 4	344, 204 ..	Finchley Vasilika's Masterpiece
Finchley Lady Burnham ..	48129	240	4	4,100	6·73	275·8	350	Mature	328, 384, 436, 359	Werribee Lord Burnham
Finchley Nasturtium ..	39743	273	13	4,263	7·40	315·3	350	Mature	379, 365 ..	Werribee Lord Burnham
Johnson, F. G., Horsham, Jersey (5).										
Firebrace Molly	76232	273	N.C.K.	4,019	6·24	250·7	250	Sr. 2	.. ..	Orphanage Lady's Vanguard
Orphanage Clara 7th ..	73300	273	N.C.K.	5,424	6·33	343·4	290	Sr. 3	.. ..	Banyule Silverstone
Orphanage Molly 14th ..	Vol. 29	273	N.C.K.	5,291	4·84	255·9	230	Jr. 2	.. ..	Banyule Bungana
Thurso Golden Lady ..	55544	273	N.C.K.	4,840	5·18	250·7	350	Mature	.. ..	Banyule Combination
Firebrace Lady	76231	273	N.C.K.	4,240	5·32	225·5	250	Sr. 2	.. ..	Orphanage Lady's Vanguard
Keele, H. A., Bamawm, Jersey (1).										
Ballara Flower 11th ..	75011	240 (Sold)	..	4,447	5·42	241·2	230	Jr. 2	.. ..	Werribee Twylish Master
Langlands, F. B., Horsham, Jersey (1).										
Brierwood Flower Girl 5th	65635	273	N.C.K.	7,197	5·14	370·0	310	Jr. 4	405 ..	Murona Twylair
Lind, A. E., and Sons, Mt. Taylor, Jersey (2).										
Latrobe Statuette 3rd ..	37606	273	22	8,505	4·77	405·4	350	Mature	537 ..	Banyule Joystick
Latrobe Statuette 13th ..	67561	273	25	9,690	5·82	564·1	330	Sr. 4	481 ..	Banyule Ettie's Oxford
Linke, H. P., Tarrington, Dairy Shorthorn (4).										
Corresdean Pansy 2nd ..	1793E	273	15½	7,220	3·38	244·1	350	Mature	251 ..	Willow Park Revenue 2nd
Corresdean Ruby ..	1797E	273	20	9,230	3·64	336·1	350	Mature	321 ..	Willow Park Revenue 2nd
Drumneil Pearl 4th ..	1851E	273	10	5,643	3·86	217·6	250	Sr. 2	231 ..	Willow Park Lustre 3rd
Drumneil Daisy 4th ..	1836E	273	4½	5,862	3·46	203·1	310	Jr. 4	288, 352 ..	Willow Park Lustre 3rd
Longerenong Agricultural College, Dooen, Ayrshire (3).										
Longerenong Laureate ..	26557	273	6	6,155	3·73	229·7	350	Mature	347, 300, 234, 398, 394, 293, 235, 331	Lily's Lad of Holly Green
Longerenong Laurustine 2nd	26560	240	4	7,065	4·12	290·9	350	Mature	221, 306, 323, 246, 305, 254	Longerenong Noble
Longerenong Silver Wattle 4th	30762	273	8	5,994	3·87	231·7	350	Mature	189, 244, 263	Dookie Punch
Lyon, W. H., Sale, Jersey (14).										
Avon Belinda	60362	273	N.C.K.	6,185	5·41	334·9	350	Mature	361 ..	Ruby's Beau (Imp.)
Avon Blue Bell	74945	273	N.C.K.	6,564	6·01	394·5	330	Sr. 4	227 ..	Ruby's Beau (Imp.)
Avon Colleen	C.R.	273	N.C.K.	5,670	5·72	324·6	230	Jr. 2	.. ..	Avon Ruby's Count
Avon Dawn	65244	273	N.C.K.	7,260	6·11	443·5	330	Sr. 4	392 ..	Ruby's Beau (Imp.
Avon Dianthus	Vol. 29	273	N.C.K.	7,958	5·21	414·9	290	Sr. 3	303 ..	Avon Ruby's Count
Avon Dodo	70073	273	N.C.K.	7,854	6·41	503·4	350	Mature	413 ..	Ruby's Beau Imp.)

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.		Sire.
Lyon, W. H., Szie, Jersey—*continued.*											
Avon Dukie	C.R.	273	N.C.K.	5,946	5·64	335·4	250	Sr. 2	..	..	Ruby's Beau (Imp.)
Avon Lady Love ..	65246	273	N.C.K.	6,855	5·98	409·9	330	Sr. 4	368	..	Ruby's Beau (Imp.)
Avon Nemesia 2nd ..	Vol. 29	273	N.C.K.	6,867	5·83	400·2	250	Sr. 2	..	..	Ruby's Beau (Imp.)
Avon Nestor	C.R.	273	N.C.K.	4,745	6·32	300·1	230	Jr. 2	..	..	Ruby's Beau (Imp.)
Avon Princess Sparkle ..	C.R.	273	N.C.K.	7,256	4·60	334·0	250	Sr. 2	..	..	Ruby's Beau (Imp.)
Avon Rubina	C.R.	210 (Sold)	..	3,810	5·85	222·8	290	Sr. 3	256	..	Avon Ruby's Count
Avon Wallflower ..	C.R.	273	N.C.K.	5,694	6·16	350·7	230	Jr. 2	..	..	Ruby's Beau (Imp.)
Avon Ruby Golden ..	65249	210 (Sold)	..	4,305	5·39	232·1	350	Mature	336	..	Ruby's Beau (Imp.)
Macauley, C. W., Rochester, Jersey (3).											
Taranah Chime 5th ..	C.R.	273	N.C.K.	5,390	5·51	296·8	230	Jr. 2	..	..	Werribee Twylish Master
Taranah Fair Lady 5th ..	Vol. 29	273	N.C.K.	5,576	5·35	298·4	270	Jr. 3	316	..	Taranah Champion
Taranah Floss 6th ..	Vol. 29	273	N.C.K.	4,437	5·86	260·2	230	Jr. 2	..	..	Werribee Twylish Master
McCormack, M., and Sons, Mansfield, Red Poll (3).											
Cypress Anna	6802A	240	4	6,435	3·68	236·7	270	Jr. 3	..	..	Blackwood Parody
Cypress Cherryleaf ..	6386AA	210	4	5,790	3·23	192·7	290	Sr. 3	278	..	Blackwood Parody
Cypress Marion	5193D	273	N.C.K.	12,527	3·85	481·9	350	Mature	412	..	Woodburn Glennie
McKenzie, Mrs. E. J., and Sons, Woodford, Jersey (3).											
Kameruka Hope Ever ..	67282	273	9	5,232	5·10	267·0	350	Mature	..	..	Hediwin (Imp.)
Spring Valley Dillwynia ..	78920	273	9	4,962	5·51	273·2	270	Jr. 3	..	..	Samare's Golden Prince (Imp.)
Spring Valley Virginia 49th	Vol. 29	273	16	4,713	5·18	244·0	230	Jr. 2	..	..	Selsey Gay Prince
McMinn, Mrs. C., Bamawm, Jersey (1).											
Ballara Ideal 9th ..	65296	273	9	4,979	5·75	286·3	310	Jr. 4	..	..	Ballara Lord Masterpiece 2nd
McNabb, G. A., and Son, Irrewillipe East, Jersey (7).											
Greenwood Pastine ..	71665	273	N.C.K.	6,173	5·87	362·4	270	Jr. 3	316	..	Selsey Maranta's King
Maxon Bright Ranunculus	77618	273	N.C.K.	4,835	6·09	294·6	230	Jr. 2	..	..	Maxon Starbright's Prince 5th
Maxon Count's Lodestone 2nd	54020	273	N.C.K.	6,107	5·03	307·1	350	Mature	339, 339, 256, 521, 439		Maxon Count Graceful
Maxon Count's Pansy 4th	77622	273	N.C.K.	3,822	6·56	250·6	250	Sr. 2	..	..	Maxon Count Graceful
Maxon D's Clara ..	Vol. 29	273	N.C.K.	4,958	5·03	249·6	230	Jr. 2	..	..	Maxon Count's Dawn
Maxon Noble's Lodie 2nd	58357	240 (sold)	..	5,602	5·48	307·0	350	Mature	310, 259, 429, 399		Avalon Noble 8th
Maxon Sweet Estelle ..	54029	273	N.C.K.	7,249	5·32	385·6	350	Mature	285, 397, 326, 488, 455		Maxon Count Graceful
Maher, R. H., Tongala, Jersey (17).											
Rosemont Daisy 7th ..	73758	273	N.C.K.	6,473	5·44	351·9	330	Sr. 4	325	..	Rosemont Laddie Fowler 3rd
Rosemont Jenny Lind 14th	73760	273	N.C.K.	5,281	5·20	274·7	330	Sr. 4	260	..	Rosemont Volunteer
Rosemont Jenny Lind 21st	Vol. 29	273	N.C.K.	3,485	5·50	191·6	230	Jr. 2	..	..	Belgonia Perree
Rosemont Lady Fowler 29th	Vol. 29	273	N.C.K.	3,447	5·39	185·7	250	Sr. 2	..	..	Belgonia Perree
Rosemont Lady Fowler 31st	Vol. 29	273	N.C.K.	5,253	5·16	271·1	230	Jr. 2	..	..	Belgonia Aim High
Rosemont Lady Fowler 33rd	Vol. 29	273	N.C.K.	4,149	5·42	225·0	230	Jr. 2	..	..	Belgonia Perree
Rosemont Lady Fowler 35th	Vol. 29	273	N.C.K.	4,728	4·96	234·7	230	Jr. 2	..	..	Belgonia Aim High
Rosemont Lassie Fowler 12th	61061	273	N.C.K.	6,405	5·23	335·1	350	Mature	291, 301	..	Rosemont Laddie Fowler 3rd
Rosemont Laura 9th ..	61064	273	9	5,284	5·60	296·1	350	Mature	190, 291	..	Rosemont Laddie Fowler 3rd
Rosemont Laura 11th ..	78714	273	N.C.K.	5,239	5·13	268·5	310	Jr. 4	..	..	Belgonia Perree
Rosemont Laura 13th ..	Vol. 29	273	N.C.K.	3,339	5·36	178·9	230	Jr. 2	..	..	Belgonia Perree
Rosemont Primrose 6th ..	61065	273	N.C.K.	8,127	4·90	413·0	350	Mature	339, 403, 426		Rosemont Laddie Fowler 3rd
Rosemont Primrose 9th ..	78716	273	N.C.K.	6,800	5·19	352·7	310	Jr. 4	..	..	Belgonia Perree
Rosemont Primrose 11th ..	Vol. 29	273	N.C.K.	3,809	5·07	193·1	230	Jr. 2	..	..	Belgonia Aim High
Rosemont Primrose 12th ..	Vol. 29	273	N.C.K.	4,748	4·95	234·9	230	Jr. 2	..	..	Belgonia Perree
Rosemont Silvermine 18th	Vol. 29	273	N.C.K.	4,766	5·15	245·6	230	Jr. 2	..	..	Belgonia Aim High
Rosemont Silvermine 19th	Vol. 29	273	N.C.K.	3,495	4·86	169·9	230	Jr. 2	..	..	Belgonia Perree
Maloney, P. J., Tongala, Jersey (2).											
Belgonia Buttercup 5th ..	70222	273	N.C.K.	7,985	5·73	457·9	310	Jr. 4	402, 486	..	Aim High (Imp.)
Belgonia Junette 9th ..	75110	273	27	7,898	5·60	442·3	230	Jr. 2	..	..	Aim High (Imp.)
Manly, R. A. A., Somerville, Dairy Shorthorn (2).											
Morven Cressida 70th ..	C.C.	273	12	6,277	4·02	252·3	250	Sr. 2	..	..	Morven Duke of Brunswick 18th
Morven Duchess of Brunswick 68th	C.C.	273	8	6,088	4·09	248·8	270	Jr. 3	..	..	Morven Lord Cressida 26th
Mason, V. J., Ferntree Gully, Guernsey (1).											
Osmanie Patience ..	9204	273	N.C.K.	5,931	4·97	295·0	250	Sr. 2	..	..	Yarraview Masher

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Meaklim Bros., Mooroopna, Dairy Shorthorn (12).										
Drumneil Alice	C.C.	273	N.C.K.	6,604	3·00	198·2	290	Sr. 3	260 ..	Drumneil Bounty
Drumneil Daisy 5th ..	C.C.	273	N.C.K.	8,795	3·84	338·0	230	Jr. 2	.. ..	Willow Park Barrington 46th
Drumneil Dulcie	1839E	273	N.C.K.	9,998	3·39	339·0	330	Sr. 4	312, 251 ..	Willow Park Lustre 3rd
Drumneil Dulcie 2nd ..	1840E	273	N.C.K.	7,568	3·63	274·6	250	Sr. 2	.. ..	Willow Park Barrington 46th
Drumneil Fairy 6th ..	1842E	273	N.C.K.	7,707	3·86	297·7	270	Jr. 3	299 ..	Willow Park Lustre 3rd
Drumneil Ida 2nd ..	C.C.	273	N.C.K.	7,621	3·74	285·2	230	Jr. 2	.. ..	Willow Park Barrington 46th
Drumneil Lily 3rd ..	C.C.	273	N.C.K.	8,305	3·83	318·1	230	Jr. 2	.. ..	Willow Park Barrington 46th
Drumneil Lucy	1847E	273	N.C.K.	8,513	3·96	337·3	270	Jr. 3	304 ..	Willow Park Lustre 3rd
Drumneil Nellie 6th ..	1849E	273	N.C.K.	8,375	3·58	299·7	270	Jr. 3	320 ..	Willow Park Lustre 3rd
Drumneil Princess 7th ..	1854E	273	N.C.K.	9,543	4·07	388·3	310	Jr. 4	314, 371 ..	Willow Park Lustre 3rd
Drumneil Roany 3rd ..	C.C.	273	16	6,168	3·78	233·1	250	Sr. 2	.. ..	Willow Park Lustre 3rd
Drumneil Snowdrop 2nd ..	790E	273	N.C.K.	7,920	3·73	295·1	350	Mature	380, 381 ..	Drumneil Bounty 2nd
Mitchell, R. H., Linton, Jersey (4).										
Clifford Farm Belladonna ..	56817	273	19	8,672	5·54	481·1	350	Mature	490, 401, 474	Wompini V.C.
Clifford Farm Misty Maiden	52273	273	15	8,120	5·82	472·5	350	Mature	299, 391, 424, 443, 418	Clifford Farm Chieftain
Clifford Farm Rose Marie..	75664	273	23½	8,250	4·68	385·8	290	Sr. 3	363 ..	Clifford Farm Flashlight
Clifford Farm Shirley ..	75665	273	19	6,957	5·90	410·6	270	Jr. 3	391 ..	Clifford Farm Danny Boy
Nancarrow Bros., Kerang, Jersey (3).										
Pine Ridge Dream Girl 4th	68646	273	25	9,654	5·47	528·4	290	Sr. 3	404, 431 ..	Duke of the Lake (Imp.)
Pine Ridge Hawthorn 2nd	63730	273	N.C.K.	10,207	4·78	488·0	350	Mature	296, 432, 495, 504	Duke of the Lake (Imp.)
Pine Ridge Dream Girl ..	54753	210	4	5,655	4·91	277·7	350	Mature	327, 368, 244	Woodside Reprieve Volunteer
Nash, L., Launching Place, Jersey (6).										
Devon Glen Princess Sally	66220	240	4	4,755	5·95	282·7	330	Sr. 4	395 ..	Banyule Voltage
Devon Glen Princess Sally 2nd	66221	273	10	4,290	5·98	256·6	310	Jr. 4	395 ..	Ashcombe Hero
Elm Grove Island Queen ..	61464	273	N.C.K.	6,628	5·81	384·8	350	Mature	281, 340, 485, 441	Werribee Island King
Elm Grove Linda's Gladness	76117	273	7	5,661	4·84	274·1	270	Jr. 3	252 ..	Staghorn Clementine's Noble 3rd
Elm Grove September Maid	76119	240	4	4,747	5·62	266·7	270	Jr. 3	249 ..	Glen Iris Golden Man
Mornmoot Princess Madeira 10th	58570	273	N.C.K.	7,692	4·55	350·0	350	Mature	351, 286 ..	Werribee Warrior
Nicholas, M. A., Sherbroke, Jersey (6).										
Selsey Golden Rose ..	69062	273	13½	6,772	4·90	332·0	310	Jr. 4	322, 361 ..	Samare's Golden Prince (Imp.)
Selsey Golden Rose 2nd ..	78877	273	17	5,553	5·76	319·8	230	Jr. 2	.. ..	Samare's Golden Prince (Imp.)
Selsey Royal Wyandotte 2nd	78884	273	15	5,781	5·41	312·9	230	Jr. 2	.. ..	Selsey Right Royal
Selsey Samare's Roseleaf ..	73885	273	19	6,489	6·31	409·6	270	Jr. 3	360 ..	Samare's Golden Prince (Imp.)
Selsey Samare's Starbright	69070	273	15½	7,385	5·88	434·6	290	Sr. 3	363, 381 ..	Samare's Golden Prince (Imp.)
Selsey Samare's Starbright 2nd	78888	273	13	4,793	6·09	291·9	230	Jr. 2	.. ..	Samare's Golden Prince (Imp.)
Noble, T. M., and Sons, Maffra, Jersey (5).										
Finchley Master's Canary	52727	273	17	9,291	6·52	605·6	350	Mature	388, 477, 481, 470, 564, 525	Finchley Masterman
Finchley Music 5th ..	61611	273	N.C.K.	8,859	6·40	566·8	350	Mature	444, 509, 471, 489	Finchley Vasilika's Masterpiece
Finchley Nasturtium 8th ..	66462	273	N.C.K.	9,789	6·07	593·8	310	Jr. 4	357, 416 ..	Werribee Lord Burnham
Finchley Nasturtium 9th ..	66463	273	N.C.K.	12,597	6·19	780·1	290	Sr. 3	382, 514 ..	Finchley Masterman
Selsey Myrtle	64222	273	16	10,383	5·27	547·3	350	Mature	321, 455, 476	Brampton Great Boy (Imp.)
Noonan, G., Benalla, Jersey (2).										
Rosemont Lady Fowler 18th	73761	273	N.C.K.	7,239	5·29	383·1	350	Mature	260 ..	Rosemont Laddie Fowler 3rd
Rosemont Silvermine 10th	73765	273	N.C.K.	6,636	5·78	383·5	350	Mature	304, 412 ..	Rosemont Laddie Fowler 3rd
O'Neill, J., Echuca, Jersey (5).										
Fourshells Yvette ..	38349	273	11	7,563	5·36	405·0	350	Mature	490, 436, 405, 374, 365, 374, 392	Belgonia Propeller
Ullina Countess	Vol. 29	273	15	5,027	6·74	338·6	230	Jr. 2	.. ..	Mornmoot Satisfaction's Warrior
Ullina Heather	64692	273	25	7,785	6·02	469·0	350	Mature	282, 358, 354, 463	Ballara Fancy King
Ullina Princess Rose ..	74312	273	19	7,562	5·68	429·3	290	Sr. 3	355, 421 ..	Melrose Outlook
Ullina Yvonne	74313	273	12	6,227	5·37	334·4	350	Mature	332, 382 ..	Ballara Fancy King

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Parker, L. M., Tallarook, Dairy Shorthorn (4).										
Deep Dale Betty ..	1801E	273	31	9,860	4·50	443·4	350	Mature	396 ..	Willow Park Banker 3rd
Deep Dale Polly 2nd ..	C.C.	273	15	7,312	4·03	294·6	270	Jr. 3	.. ..	Willow Park Barrington 26th
Deep Dale Polly 3rd ..	C.C.	273	19	7,053	3·95	278·6	230	Jr. 2	.. ..	Willow Park Barrington 26th
Deep Dale Sarrah 2nd ..	C.C.	273	7½	5,363	3·81	204·4	230	Jr. 2	.. ..	Willow Park Barrington 26th
Parkes, E. F., Merton, Jersey (2).										
Irona Camillia	Vol. 29	273	N.C.K.	4,661	6·40	298·4	290	Sr. 3	277 ..	Irona Beau Vallet
Irona Petal's Margaret ..	Vol. 29	273	N.C.K.	5,213	5·10	266·0	230	Jr. 2	.. ..	Victoria Danny Boy
Pattison, G., Tongala, Ayrshire (3).										
Willow Park Jeanette ..	31007	273	4	8,757	3·94	345·1	350	Mature	343, 393, 367, 343	Fulham Beam
Willow Park Marlene ..	34158	273	6	5,050	4·67	235·6	250	Sr. 2	229 ..	Hyde Park Prelate
Willow Park Rosina ..	26810	273	7½	7,944	4·11	326·4	350	Mature	278, 376, 355, 347, 324, 317	Fulham Beam
Payne, A. E. T., Lilydale, Guernsey (7).										
Yarraview Chamois ..	9762	273	22	8,279	5·07	419·5	230	Jr. 2	.. ..	Yarraview Factor
Yarraview Clara's Fashion	9766	273	19½	6,299	4·91	309·4	230	Jr. 2	.. ..	Honoria's Benefactor (Imp.)
Yarraview Carol	9761	273	18	6,267	5·42	339·4	280	Jr. 2	.. ..	Honoria's Benefactor (Imp.)
Yarraview Delight ..	5167	210 (Died)	..	7,320	5·06	370·1	350	Mature	400, 452, 455, 486, 437	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Levity ..	9781	273	11½	7,502	4·93	369·9	250	Sr. 2	348 ..	Camilla's Majestic of Maple Lodge (Imp.)
Yarraview Royal ..	6642	273	18	8,118	4·55	369·4	350	Mature	431, 385, 314	Yarraview Sunrise
Yarraview Ruby ..	5178	273	36	14,205	4·49	637·7	350	Mature	378, 394, 427, 547	Camilla's Majestic of Maple Lodge (Imp.)
Phillips, J. H., Swan Hill, Jersey (9).										
Ryelands Fashionette ..	Vol. 29	273	9	6,422	4·57	293·2	310	Jr. 4	326 ..	Banaview Master
Kantara Jessamine 2nd ..	40487	273	11	10,146	4·35	441·6	350	Mature	331, 363, 404, 422, 413, 451, 439, 408, 515	Glen Iris Valiant Count
Ryelands Balcony Rose ..	78809	273	14	5,624	5·75	323·5	250	Sr. 2	292 ..	Banaview Master
Ryelands Brooklet ..	Vol. 29	273	15	7,299	4·72	344·7	250	Sr. 2	290 ..	Banaview Master
Ryelands Lavona ..	73837	273	22	9,326	5·27	491·5	290	Sr. 3	337, 472 ..	Banaview Master
Ryelands Springflower ..	C.R.	273	12½	4,464	5·11	228·2	230	Jr. 2	.. ..	Banaview Master
Ryelands Sweet Lavender	59362	273	12	6,588	5·16	339·8	350	Mature	232, 246, 298, 338, 302	Orphanage Zaffarine's Prince
Ryelands Vanilla Butter	C.R.	273	13	5,921	4·83	286·1	230	Jr.	.. ..	Banaview Master
Ryelands Vanilla ..	73839	273	18	7,728	5·25	406·1	290	Sr. 3	298, 302 ..	Banaview Master
Powell, T. S., Mansfield, Jersey (7).										
Carellen Anna Carlovna ..	75604	273	7	5,061	5·76	291·3	230	Jr. 2	.. ..	Carellen Northern Duke
Carellen Golden Cream ..	70637	273	13	7,668	5·67	434·5	250	Sr. 2	315 ..	Glen Avon Starbright's Airshaft
Carellen Lady Madeira ..	70639	273	20	8,235	5·78	476·2	270	Jr. 3	408 ..	War Valour (Imp.)
Carellen Lady Starbright ..	65877	273	23	9,113	6·10	556·2	310	Jr. 4	419, 548 ..	Darnum Park Lord Starbright
Monterey Maid	49602	273	19½	9,276	4·71	436·7	350	Mature	428, 460, 520, 502, 534	Mornmoot Starbright King
Monterey Melody's Mascot	58530	273	20½	11,550	4·97	574·6	350	Mature	420, 398, 547, 583, 595	Roscliff Mariposa's Master
Navuloa Master's Encore ..	68279	273	24	9,767	4·73	462·0	350	Mature	386, 363, 487	Werribee Grandmaster
Prince, Mrs. H. A., Swan Hill, Jersey (3).										
Pine Ridge Dream Girl 2nd	68644	240 (Herd withdrawn)	..	8,805	5·36	471·6	330	Sr. 4	386, 499, 571	Duke of the Lake (Imp.)
Pine Ridge Molly 4th ..	73498	240 (Herd withdrawn)	..	8,190	5·78	473·2	310	Jr. 4	464, 578 ..	Pine Ridge Golden Duke
Surrey Bonnie Madeira 4th	64385	240 (Herd withdrawn)	..	8,865	4·58	405·8	350	Mature	478 ..	Brucevale Lord Fancy
Raggatt, F., Tongala, Jersey (1).										
Strathbow Heather Belle 12th	73979	273	10	7,992	5·92	473·3	270	Jr. 3	348 ..	Tooravale Arbitrator
Reid, Miss B. B., Bundoora, Jersey (6).										
Jubilee Lathyrus ..	Vol. 29	273	14	4,817	4·75	228·8	230	Jr. 2	.. ..	Jubilee Richlight
Jubilee Lawn	Vol. 29	273	14½	4,352	5·41	235·4	230	Jr. 2	.. ..	Jubilee Torchlight
Jubilee Lilly-pilli ..	67239	273	14	6,147	4·67	287·2	350	Mature	.. ..	Werribee Stylish Masterpiece
Jubilee Linette	67240	273	4½	5,220	4·36	227·8	350	Mature	.. ..	Werribee Stylish Masterpiece
Jubilee Wateraven ..	Vol. 29	273	14	3,425	4·40	150·6	230	Jr. 2	.. ..	Jubilee Richlight
Jubilee Wintergreen ..	76990	207	13	4,485	5·02	225·2	270	Jr. 3	.. ..	Jubilee Allight

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Richardson, W. S., Bacchus Marsh, Jersey (3).										
Neerod Bright Eyes ..	73101	273	14	5,453	6·57	358·0	310	Jr. 4	..	Mornmoot Montrose
Sutton Lea Rose Marie ..	64399	273	18½	6,086	5·64	343·5	350	Mature	335	Victorious Pioneer (Imp.)
Willis Vale Colonel's Pansy	64921	273	19	6,411	5·54	354·9	350	Mature	323	Willis Vale Mystic Colonel
Ronalds, O., Tarago, Jersey (1).										
Arlington Clementine ..	70015	273	N.O.K.	7,515	5·73	430·8	250	Sr. 2	428	War Valour (Imp.)
Ross, D. M., Croydon, Dairy Shorthorn (5).										
Willow Park Blush 13th ..	1643D	273	20	9,047	3·70	334·8	230	Jr. 2	..	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Countess 33rd	1664D	240	4	5,955	3·94	234·7	270	Jr. 3	276	Wicklesham Lord Barrington 5th (Imp.)
Willow Park Countess 35th	1512C	273	N.O.K.	8,945	3·58	320·1	230	Jr. 2	..	Anderson Imperial Cran 6th (Imp.)
Willow Park Dainty 16th..	1518C	273	22	10,350	3·43	355·0	270	Jr. 3	271	Anderson Imperial Cran 6th (Imp.)
Willow Park Fairy 13th ..	1680D	273	N.O.K.	10,308	3·39	349·6	310	Jr. 4	335, 383	Anderson Imperial Cran 6th (Imp.)
St. Joseph's Home, Sebastopol, Jersey (4).										
Autrim Boronia	70002	273	12	4,133	5·52	228·0	200	Sr. 3	234, 321	Marfield Joker
Lipook Hazel	72458	273	14	6,692	5·68	379·9	290	Sr. 3	291, 412	Marfield Joker
St. Joseph's Design's Patricia	C.R.	273	15½	6,108	5·34	326·3	230	Jr. 2	..	Selsey Design's Standard
St. Joseph's Patricia 2nd ..	Vol. 29	273	19	6,546	5·21	341·0	230	Jr. 2	..	Lipook Mariner
Sadler, R. W., Noorat, Ayrshire (3).										
Burnbrae Aria	32015	273	15½	6,347	4·83	306·5	290	Sr. 3	..	Burnbrae Marquis
Burnbrae Diamond ..	31136	273	4	5,922	4·41	261·4	350	Mature	..	Ecclefechan Lionel
Burnbrae Lady Luck ..	C.R.	273	4	3,672	4·73	173·7	230	Jr. 2	..	Kerlie Park Moss
Smith Bros., Mirboo North, Jersey (6).										
Sylvan Hill Elizabeth ..	79051	240	4	4,410	5·09	224·6	270	Jr. 3	196	Glen Iris Bow Bells
Sylvan Hill Evensong ..	74048	273	N.O.K.	8,146	4·34	353·9	310	Jr. 4	361, 341	Glen Iris Bow Bells
Sylvan Hill Lady Bells ..	64408	273	N.O.K.	7,479	5·46	408·5	350	Mature	282, 350, 385, 302	Glen Iris Bow Bells
Sylvan Hill Mercedes ..	79057	240	N.O.K.	4,140	4·46	184·5	270	Jr. 3	156	Glen Iris Bow Bells
Sylvan Hill Sainfoin ..	79058	240	N.O.K.	4,567	5·75	262·4	270	Jr. 3	245	Glen Iris Bow Bells
Sylvan Hill Vanity ..	50740	240	N.O.K.	5,055	4·09	207·0	350	Mature	321, 309, 373, 393, 372, 342, 349	Somerville Heir Apparent
Smith, R. W., and Son, Swan Hill, Friesian (12).										
Wattle Bank Cremona 3rd	Vol. 14	273	29	12,032	3·43	412·2	330	Sr. 4	368, 382	Hengest Lizzie Segis
Wattle Bank Fairy ..	App. I., Vol. 13	273	21	11,705	2·98	348·3	350	Mature	363, 392	Greenvale Woodcrest Oakwood 2nd
Wattle Bank Gloria ..	Vol. 15	273	16	7,080	3·65	258·2	230	Jr. 2	..	Wattle Bank Segis De-kol
Wattle Bank Helen ..	Vol. 15	273	25	8,716	3·02	263·1	230	Jr. 2	..	Wattle Bank Segis De-kol
Wattle Bank Mercedes Queen	6114	273	23	13,137	3·15	413·9	350	Mature	329, 408	Hengest Lizzie Segis
Wattle Bank Primrose 4th	C.R.	273	40	15,222	2·91	443·7	250	Sr. 2	455	Wattle Bank Segis De-kol
Wattle Bank Princess 13th	C.R.	273	17	10,377	2·75	285·0	270	Jr. 3	260	Wattle Bank Segis De-kol
Wattle Bank Princess Rose	C.R.	273	24	8,616	2·83	243·8	230	Jr. 2	..	Wattle Bank Segis De-kol
Wattle Bank Segis Jessie	6123	273	28	14,237	3·01	428·3	350	Mature	427, 490	Hengest Lizzie Segis
Wattle Bank Tulip ..	C.R.	273	25	10,129	3·11	314·7	230	Jr. 2	..	Wattle Bank Oakview Segis
Wattle Bank Venus ..	C.R.	273	27	8,214	3·27	268·6	230	Jr. 2	..	Wattle Bank Oakview Segis
Ingolston Ideal Beauty 2nd	4719	273	39	14,809	3·25	480·6	350	Mature	455, 550	Greenvale Ideal Segis
Stephens, Dr. F. G., Vermont, Guernsey (4).										
Cleveland Belle	8492	273	7	4,126	4·29	176·8	230	Jr. 2	..	Werribee Prince Don
Cleveland Harmony ..	8493	273	10	4,875	4·93	240·2	230	Jr. 2	..	Werribee Prince Don
Vermont Fay	8008	273	16	6,393	4·66	298·2	290	Sr. 3	304	Vermont Prince Johnnie
Vermont Henrietta ..	9561	273	15½	7,133	4·62	329·6	310	Jr. 4	164, 274	Roads End Henri
Stirling, H. V., Meade, Jersey (2).										
Banyule Ishta	51650	273	7½	6,878	5·51	378·9	350	Mature	347, 374, 329, 422	Banyule Pitman
Coimbra Silver Queen 3rd	75691	273	9	5,727	4·87	278·7	270	Jr. 3	250	Coimbra Airman
Tandberg, G., and Son, Warragul, Friesian (1).										
Bolero Sylvia Mary ..	5296	273	13	8,919	3·05	271·7	350	Mature	311	Winlaton Pioneer
Tandberg, G., and Son, Warragul, Illawarra Shorthorn (8).										
Donrobin Bangle ..	10268	273	13	8,229	3·96	325·7	350	Mature	.	Kurrawong Premier 2nd
Douglas Vale Birdie ..	Vol. 8	273	15	5,155	4·26	219·7	230	Jr. 2	..	Numbawarra Maiden's Sultan
Myrtleville Lovely ..	21598	210	4	4,537	3·89	176·6	350	Mature	..	Greyleigh Dispatcher
Rockleigh Lovely 2nd ..	8176	240	4	5,505	4·11	226·4	350	Mature	312	Reveller of Hillview
Veresdale Bush Bee ..	28351	273	16	8,943	4·16	372·3	290	Sr. 3	264, 532	Ovensdale Pearl's Renown
Veresdale Lulu	28363	273	12½	6,998	4·63	324·2	310	Jr. 4	245, 323	Veresdale Diamond
Veresdale Peach 2nd ..	Vol. 8	273	13	5,889	4·92	289·6	230	Jr. 2	..	Numbawarra Maiden's Sultan
Veresdale Royal	Vol. 8	273	15½	6,759	3·76	254·4	230	Jr. 2	.	Numbawarra Maiden's Sultan

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Teychenne and Ducret, Wesburn, Guernsey (3).										
Meadow Vale Boquet ..	Vol. 9	273	4½	4,686	5·02	235·3	230	Jr. 2	.. ..	Yarraview Marvel
Meadow Vale Marcia ..	7394	273	20	9,527	5·34	508·4	330	Sr. 4	.. ..	Camilla's Majestic of Maple Lodge (Imp.)
Melbourne Golden Babette	4461	273	15	9,750	4·43	431·5	350	Mature	.. ..	Woodlands Fleur-de-Lys (Imp.)
Tomasetti, B. G., Drouin West, Ayrshire (6).										
Alvaston Audrey ..	31922	273	18	8,279	4·08	337·6	330	Sr. 4	203, 284, 303	Cathcart Masterpiece
Glen Athol Merry Lass ..	C.R.	273	5	6,807	4·22	287·2	350	Mature	259, 336, 304	Glencorren Merry Lad
Glencorren Gay Girl ..	C.R.	273	19	7,647	4·07	311·5	230	Jr. 2	.. ..	Glenfallock Pilot
Glencorren Precious ..	33608	273	5	6,294	4·18	263·2	290	Sr. 3	220, 252 ..	Scotswood Flashlight
Glencorren Vida ..	33612	273	11	8,493	4·16	353·8	270	Jr. 3	289 ..	Scotswood Flashlight
Gorinn Merry Maid ..	33668	273	16	7,041	4·39	309·4	310	Jr. 4	273, 322 ..	Glencorren Edison
Trevaskis, F. T., Tongala, Jersey (3).										
Ballara Dainty 3rd ..	60443	273	N.C.K.	6,744	5·41	365·0	330	Sr. 4	263, 274 ..	Kyora Dream's Gadget 2nd
Grovelea Ranger's Bee ..	66860	273	N.C.K.	7,356	4·59	337·5	350	Mature	214 ..	Orphanage Ranger
Preston Dawn Maid ..	45759	150	N.C.K.	4,012	4·67	187·3	350	Mature	261, 258 ..	Kyora Mayflower's Fancy
Turner, A. J., Yannathan, Jersey (2).										
Finchley Nasturtium 11th	Vol. 29	273	N.C.K.	4,695	6·40	300·7	230	Jr. 2	.. ..	Finchley Vasilika's Masterpiece
The Wattles Silvermine 10th	74170	240	4	4,927	5·35	263·5	270	Jr. 3	311 ..	The Wattles Young Gamboge
Tyssen, C. J., Warragul, Jersey (1).										
Hylsbroke Marina 2nd ..	Vol. 29	256	N.C.K.	7,862	5·70	448·1	250	Sr. 2	.. ..	The Wattles Young Gamboge
Unthank, Miss Freda, Hastings, Jersey (6).										
St. John's Letitia 10th ..	64178	240	4	6,150	5·25	322·7	350	Mature	.. ..	St. John's Curio's Lad
St. John's Sapphire 6th ..	Vol. 29	273	N.C.K.	6,507	4·68	304·1	230	Jr. 2	.. ..	St. John's Letitia 10th's Chief
St. John's Volunteer's Pearl	73852	273	N.C.K.	5,862	5·18	303·5	310	Jr. 4	.. ..	St. John's Rosebud's Volunteer
The Hollie's Fancy 2nd ..	Vol. 29	273	N.C.K.	5,583	5·42	302·7	230	Jr. 2	.. ..	Windrest Ranee's Lad
The Hollie's Pearl ..	Vol. 29	273	N.C.K.	10,164	5·18	526·5	350	Mature	.. ..	St. John's Jewel 3rd's Investor
The Hollie's Seaweed 3rd ..	Vol. 29	273	N.C.K.	5,215	4·96	258·9	230	Jr. 2	.. ..	The Hollie's Chief
Vagg, E. J., Leongatha, Jersey (1).										
Bonnay Doris' Carnation ..	75281	273	11½	4,925	5·70	280·7	270	Jr. 3	311 ..	Selsey Brampton Boy
Vaughan Bros., Girgarre, Jersey (11).										
Lynroy Beta	53900	273	12	8,201	5·85	479·7	350	Mature	422, 432, 516, 653	Werribee Laverock
Lynroy Fancy 4th ..	62864	273	12	6,881	5·82	400·3	350	Mature	382, 268, 374, 465, 416	Werribee Laverock
Lynroy Fay	67740	273	13	6,906	5·67	391·7	350	Mature	283, 443, 426	Werribee Laverock
Lynroy Glad Eye ..	67741	273	23	9,559	5·28	505·1	350	Mature	331, 448 ..	Werribee Laverock
Lynroy Glady's 4th ..	62866	273	9	7,557	5·34	403·3	350	Mature	398, 325, 347, 516	Werribee Laverock
Lynroy Gladys' 6th ..	Vol. 29	273	22	8,526	5·75	490·4	310	Jr. 4	351 ..	Werribee Laverock
Lynroy Jill	72573	273	20	8,088	6·21	502·6	350	Mature	331, 473 ..	Werribee Laverock
Lynroy Mona	C.R.	273	27	8,936	5·41	483·5	230	Jr. 2	.. ..	Werribee Laverock
Lynroy Nancy's Belle ..	72575	273	20	7,535	5·50	414·3	310	Jr. 4	341 ..	Werribee Laverock
Lynroy Nectar	C.R.	273	14½	5,299	6·59	349·3	230	Jr. 2	.. ..	Carellen Madeira's Pride
Lynroy Sweet Gem ..	C.R.	273	15	4,440	5·42	240·7	230	Jr. 2	.. ..	Werribee Laverock
Wade, W. J., Stratford, Jersey (3).										
Inverbroom Molly's Bunty	57762	273	N.C.K.	8,152	5·13	418·5	350	Mature	289, 335, 388, 408	Grangelea Butter Boy 3rd
Inverbroom Ruby's Bunty	57763	273	N.C.K.	8,297	4·93	408·9	350	Mature	228, 233, 351, 412	Grangelea Butter Boy 3rd
Inverbroom Ruby's Marie	67091	273	N.C.K.	9,983	4·84	482·7	310	Jr. 4	508, 442 ..	Inverbroom Marie's Majesty
Walker, C. S., Swan Hill, Jersey (17).										
Clarendon Eyre Happy Days 6th	65945	273	N.C.K.	7,826	4·67	365·8	350	Mature	287, 380, 334	Clarendon Eyre Eminent's Lohengrin
Clarendin Eyre Love Lies 7th	65948	273	N.C.K.	10,287	4·98	512·5	350	Mature	366, 418, 478	Clarendon Eyre Ruddigore 5th
Warwick Augustus Marie 8th	Vol. 29	273	N.C.K.	6,321	4·91	310·1	270	Jr. 3	230 ..	Warwick Golden Lord
Warwick Beauty 6th ..	64825	273	N.C.K.	7,538	4·82	363·5	350	Mature	225, 306, 399, 344	Warwick Golden Lord
Warwick Bellbird 6th ..	Vol. 29	273	N.C.K.	5,166	5·56	303·8	270	Jr. 3	256 ..	Leven Brae A'do's Masterpiece
Warwick Bellbird 7th ..	C.R.	273	N.C.K.	5,502	5·05	278·1	230	Jr. 2	.. ..	Leven Brae A'do's Masterpiece

Name of Cow.	Herd Book No.	No. of Days in Test.	Milk Last Day of Test. lb.	Milk. lb.	Average Test.	Butter Fat. lb.	Standard Required.	Class.	Previous Yields of Butter Fat.	Sire.
Walker, C. S., Swan Hill, Jersey—*continued.*										
Warwick Cello 2nd ..	Vol. 29	273	N.C.K.	6,615	5·44	360·0	270	Jr. 3	339 ..	Leven Brae A'do's Masterpiece
Warwick Cello 3rd ..	C.R.	273	N.C.K.	6,104	5·52	336·7	230	Jr. 2	..	Leven Brae A'do's Masterpiece
Warwick Cream Stockings 3rd	69628	273	N.C.K.	8,762	5·09	445·6	350	Mature	314, 411, 425	Warwick Golden Lord
Warwick Cream Stockings 5th	Vol. 29	273	N.C.K.	5,418	4·13	223·8	310	Jr. 4	309, 317 ..	Warwick Golden Lord
Warwick Cream Stockings 10th	Vol. 29	273	N.C.K.	5,547	5·44	301·7	230	Jr. 2	.. ..	Leven Brae A'do's Masterpiece
Warwick Design's Finesse..	79527	273	N.C.K.	6,763	5·95	402·3	270	Jr. 3	370 ..	Leven Brae A'do's Masterpiece
Warwick Polly 2nd ..	46642	273	N.C.K.	7,686	4·88	374·7	350	Mature	227, 324, 324, 454, 439, 452, 438	Preston Star King
Warwick Polly 4th ..	59945	273	N.C.K.	8,372	4·98	417·3	350	Mature	265, 329, 372, 338, 405	Glen Iris Golden Lord
Warwick Polly 6th ..	79528	273	N.C.K.	7,835	5·38	421·8	350	Mature	336, 466, 402	Glen Iris Golden Lord
Warwick Polly 14th ..	Vol. 29	273	N.C.K.	5,375	5·61	301·8	230	Jr. 2	.. ..	Leven Brae A'do's Masterpiece
Weir View Golden Design 2nd	59968	273	N.C.K.	8,558	4·96	424·9	350	Mature	323, 477, 473, 370	Weir View Golden Duke
Waterhouse, H. W., and Son, Pakenham, Jersey (4).										
Navuloa Grandmaster's Magnet	58682	273	20	8,364	5·54	463·0	350	Mature	532, 488 ..	Werribee Grandmaster
Navuloa Laburnum's Princess	78043	273	15	5,130	5·65	290·0	230	Jr. 2	.. ..	Staghorn Laburnum's Masterpiece
Navuloa Master's Stralia ..	49808	273	19	9,072	5·08	461·1	350	Mature	454, 450 ..	Werribee Grandmaster
Ovalau Grand Madge ..	78271	273	20½	6,210	4·90	304·2	230	Jr. 2	.. ..	Navuloa Magnet's Grandmaster
Watson, K. E., Gembrook, Jersey (2).										
Arranmore Golden Dream	74891	273	N.C.K.	6,242	6·16	384·4	270	Jr. 3	178, 193 ..	Glen Iris Golden Dreamer
Goronga Farm Star Turn ..	61928	180	4	4,125	5·74	236·6	350	Mature	303, 230, 262, 343	Somerville Reputed King
Whelpton, B., Whittlesea, Jersey (7).										
Coodardy Fuchsia ..	C.R.	273	20	5,742	4·68	268·6	230	Jr. 2	.. ..	Werribee Centurion
Eulomo Centurion's Duchess	Vol. 29	273	22	7,899	5·03	397·7	230	Jr. 2	.. ..	Werribee Centurion
Hemswell Babe	C.R.	273	12	5,754	5·53	318·3	230	Jr. 2	.. ..	Clarendon Eyre Eminent's Moon 2nd
Hemswell Bloom ..	Vol. 29	273	17	6,102	5·23	319·1	230	Jr. 2	.. ..	Clarendon Eyre Eminent's Moon 2nd
Hemswell Prude.. ..	76769	273	27	9,029	4·89	441·4	270	Jr. 3	333 ..	Clarendon Eyre Eminent's Moon 2nd
Hemswell's Richlight's Cowslip	C.R.	273	10	4,227	4·96	209·7	230	Jr. 2	.. ..	Jubilee Richlight
Hemswell Sally	C.R.	273	16	5,265	4·98	262·1	230	Jr. 2	.. ..	Clarendon Eyre Eminent's Moon 2nd
Williams, Estate of the late F. A., Bamawm, Jersey (6).										
Bamawm Daisy Grey ..	65321	273	N.C.K.	9,453	5·48	518·3	350	Mature	248, 376, 517	Bamawm Leon
Bamawm Daisy Bell 2nd ..	Vol. 29	273	19	7,124	6·14	437·3	230	Jr. 3	.. ..	Bamawm Mystic Lad
Bamawm Fancy Madeira ..	75051	273	N.C.K.	7,335	6·02	441·3	250	Sr. 2	352 ..	Bamawm Bonnie Boy
Bamawm Lassie Belle ..	C.R.	273	N.C.K.	4,467	6·11	272·8	250	Sr. 2	.. ..	Bamawm Bonnie Bugler
Bamawm Princess Noella ..	65323	273	15½	8,342	5·25	437·6	350	Mature	328, 472, 391	Bamawm Master Gaypiece
Bamawm Ruth	60474	273	N.C.K.	9,263	5·14	476·3	350	Mature	402, 492, 526, 535	Bamawm Leon
Wilson, A., Port Fairy, Ayrshire (6).										
Green Vale Beauty 5th ..	28554	273	16½	7,571	3·86	292·2	350	Mature	352, 394, 297	Carracoorte Squire
Jennewar Pearline ..	32628	273	13	5,782	4·04	233·4	310	Jr. 4	228 ..	Denbigh Ace
Lough View Balm ..	33866	273	12½	5,139	5·17	265·5	310	Jr. 4	.. ..	Carracoorte Bobby
Lough View Brownie ..	32778	273	10½	5,885	4·91	288·8	310	Jr. 4	196 ..	Carracoorte Bobby
Lough View Music 2nd ..	Vol. 35	273	22	6,156	4·20	258·7	270	Jr. 3	... ..	Carracoorte Bobby
Stoneleigh Fairy 2nd ..	33081	273	N.C.C.	7,047	3·91	275·4	310	Jr. 4	202 ..	Strathkellar Pride

JOIN OR FORM A WAR SAVINGS CERTIFICATE GROUP